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COMMONWEALTH BUREAU OF PLANT BREEDING AND GENETICS

PLANT BREEDING ABSTRACTS

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Note.—Initialed reviews are written by the following:—

Dr. J. Wishart .. .. J. W.

Mrs. M. Thomas .. .. M. T.

* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XXII, No. 2

C. A. B.
7 APR 1952
FILE

*STATISTICS

864. COCHRAN, W. G.
Testing a linear relation among variances.
Biometrics 1951 : **7** : 17–32.

v_i $(i = 1, \ldots k)$ are independent estimates of variances θ_i on n_i degrees of freedom. $n_i v_i/\theta_i^2$ has a χ^2 distribution on n_i degrees of freedom. The paper is concerned with testing the hypothesis that a given linear relation $\Sigma c_i \theta_i = 0$ holds among the θ_i, the c_i's being known numbers. The method suggested is to write the relation in the form

$\theta_1 + \theta_2 + \ldots + \theta_r = \theta_{r+1} + \theta_{r+2} + \ldots + \theta_k$

and to use the test criterion

$$F^1 = \frac{v_1 + v_2 + \ldots + v_r}{v_{r+1} + v_{r+2} + \ldots + v_k}.$$

On the null hypothesis this quantity has approximately an F–distribution with degrees of freedom

$$\nu_1 = \frac{(v_1 + \ldots + v_r)^2}{v_1^2/n_1 + \ldots + v_r^2/n_r},$$

$$\nu_2 = \frac{(v_{r+1} + \ldots v_k)^2}{v^2{}_{r+1}/n_{r+1} + \ldots + v_k^2/n_k}.$$

An investigation into the adequacy of the approximation and of the power of the test is given for the case $k = 3$. The large-sample distribution is also compared with other tests that suggest themselves. A numerical example of a long-term experiment on sugar beet is included.

865. CRUMP, S. L.
The present status of variance component analysis.
Biometrics 1951 : **7** : 1–16.

An elementary introduction to the problems involved in the subject is given and the methods available for their solution are described.

866. JOHNSON, N. L.
Estimators of the probability of the zero class in Poisson and certain related populations.
Ann. Math. Statist. 1951 : **22** : 94–101.

If the Poisson parameter is m, the problem discussed is to estimate e^{-m}. Three estimators are investigated and compared. The related populations are those wherein the distribution is defined by successive terms in the expansion of $[(1 + w) - w]^{-m/w}$, $-1 < w < 0$, or $0 < w$. The binomial, negative binomial, and Pólya-Eggenberger distributions are special cases.

867. PATTERSON, H. D.
Sampling on successive occasions with partial replacement of units.
J.R. Statist. Soc. (B) 1950 : **12** : 241–55.

When information is required about a population, the characteristics of which change with time, the procedure of sampling on successive occasions with partial replacement of units from occasion to occasion is useful. This paper discusses the appropriate methods of estimating the population means on different occasions, and also changes in these means. When the correlation between observations on the same units r occasions apart is ρ^r, ρ known, and the numbers of units, variances and fractions of units replaced are the same for all occasions, efficient estimates of the means are found for the last and the last but one occasions. For other occasions inefficient estimates may be used; the loss of efficiency is examined. Methods are also suggested when some of the above conditions are not satisfied.

868. SMITH, H. F.
Analysis of variance with unequal but proportionate numbers of observations in the sub-classes of a two-way classification.
Biometrics 1951 : **7** : 70–74.

An extension is made of analyses of variance to the case given in the title.

869. SUKHATME, P. V., THAWANI, V. D., PENDHARKAR, V. G. and NATU, N. P.
Revised tables for the d-test of significance.
J. Indian Soc. Agric. Statist. 1951 : **3** : 9–23.

The table of Fisher and Yates for the Fisher-Behrens test is recalculated to avoid certain biases which are known to exist. The modifications are slight and will not affect applications of the test.

870. THOMAS, M.
Some tests for randomness in plant populations.
Biometrika 1951 : **38** : 102–11.

This paper is concerned with a discussion of three tests designed to detect departure from

* General studies, see also individual crops.

randomness in the distribution of plant species over an area. The area is supposed to have been divided into a number of quadrats and the number of plants within each quadrat counted. Under the assumption of randomness these numbers will have a Poisson distribution. The type of departure from this distribution looked for is that of clustering, expressed by a double Poisson distribution. The tests are one due to Stevens, one based on the index of dispersion and one using maximum likelihood methods. Some attempt at assessing the relative merits of the tests is made.

871. COMSTOCK, R. E. and ROBINSON, H. F.
Consistency of estimates of variance components.
Biometrics 1951 : **7** : 75–82.

Research of the genetics of quantitative characters of economic plants at the North Carolina Experimental Station relies heavily on variance component estimation. This estimation has been based on normal distribution theory. The validity of this assumption is here investigated using data collected for the estimation of genetic variance in maize.

872. FEDERER, W. T.
General theory of prime-power lattice designs. IV. Analysis of p^4 treatments in blocks of p plots with four or more replicates.
Mem. Cornell Agric. Exp. Sta. 1950 : No. 299 : Pp. 29.

A numerical procedure is presented for analysing experiments containing p^4 varieties or treatments in p^3 blocks of p plots for 4 or more replicates, using as an example a case involving $3^4 = p^4$ varieties in $3^3 = p^3$ incomplete blocks or $3 = p$ plots, each with 4 and 6 replicates or complete blocks.

873. GRUNDY, P. M. and HEALY, M. J. R.
Restricted randomization and quasi-Latin squares.
J.R. Statist. Soc. (B.) 1950 : **12** : 286–91.

Yates has shown that in a 2^6 factorial design in 64 plots, the plots can be arranged in an 8×8 square pattern in such a manner that a certain set of three and four factor interactions is confounded with rows, and another similar set is confounded with columns. Unfortunately the restrictions required to effect this are such that it is possible, with certain arrangements of the rows and columns, for the contrast representing one of the main effects to consist of the contrast between the diagonally opposite pairs of quarters of the whole square. The correlation between neighbouring plots would result in this contrast having too large a variance. The authors show, in the present paper, how it is possible to carry out a restricted randomization which avoids the above difficulties. Other applications of restricted randomization are given, for example, to plaid and half-plaid squares, and to the corresponding problem for factors at three levels.

874. NAIR, K. R.
Rectangular lattices and partially balanced incomplete block designs.
Biometrics 1951 : **7** : 145–54.

It is shown that Harshbarger's simple rectangular lattices belong to the category of partially balanced incomplete blocks, but that his triple rectangular lattices, in general, do not.

875. NISSEN, Ø.
The use of systematic 5×5 squares.
Biometrics 1951 : **7** : 167–70.

Certain systematic 5×5 Latin squares in which the r^{th} row is obtained from the $(r-1)^{th}$ by a shift of 2 or 3 columns are associated with the name of K.Vik, and are still frequently used. In this paper the author shows how "Vik's short-cut method" provides a valid estimate of error when using these squares and also how these squares produce a more efficient design than Latin squares when used in a series of experiments, despite a loss in the degrees of freedom available for error.

876. SHRIKHANDE, S. S.
Designs for two-way elimination of heterogeneity.
Ann. Math. Statist. 1951 : **22** : 235–47.

The classical example of two-way heterogeneity is Youden's squares. In the cases where these designs are needed not only is the block important as a source of variation but also the position within the block. In Youden's squares each treatment occurs once in each block-position and the designs are obtained from balanced incomplete block designs with $b = v$. In the present paper the author generalizes this class of designs to those designs where each treatment occurs m times in each block-position; they are obtained from balanced incomplete block designs with $b = mv$. Designs for which b is not an integral multiple of v are also given, but here some pairs of treatments will be compared with one accuracy, while other pairs are compared with different accuracies. In every case the methods of analysis and tables of designs are given.

877. DUNCAN, D. B.
A significance test for differences between ranked treatments in an analysis of variance.
Va. J. Sci. 1951 : **2** : 171–89.

A test is described by which, after the homogeneity of a set of treatments has been discounted by analysis of variance, information can be obtained on the relative merits of the treatments considered in all possible pairs.

878. NISSEN, Ø.
Nyere metoder for forsøk med et stort antall forsøksledd. (**Modern methods for experiments with a large number of treatments**).
Forskning Forsøk Landbruk., Oslo 1951 : **2** : 192–202.

Various designs of incomplete blocks are compared with older types of designs in which there are a large number of treatments. Field plans and worked examples are to be printed separately.

879. PEREIRA, H. C.
Mathematical statistics in agricultural research.
Proc. Nairobi Sci. Phil. Soc. 1948 : **2** : 28–32.

Methods of using randomized blocks, Latin squares and three dimensional lattices for varietal trials of coffee are discussed with reference to the possibility of their widespread adoption in East Africa.

880. FEDERER, W. T.
Evaluation of variance components from a group of experiments with multiple classifications.
Res. Bull. Ia. Agric. Exp. Sta. 1951 : No. 380 : 243-310.

An analysis is presented of variance components in randomized and split plot experiments with special reference to the Iowa maize trials. For a fixed number of plots, selection for yield is most expeditious if four replicates are used; if randomized complete blocks are employed, two replicates are recommended. For a fixed number of plots, locations rather than replicates should be increased.

881. TUKEY, J. W.
Components in regression.
Biometrics 1951 : **7** : 33–69.

This paper is concerned with simple linear regressions where both the variates are subject to error. The greater part of the paper is devoted to a single example from plant breeding. An experiment by Miller, Aurand and Flach (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 304), designed to throw light on a suggestion that selection for specific aminoacids rather than for protein might lead to a more nutritive variety of maize, is analysed in detail.

882. AMARAL, E.
Problemas de estatística experimental. (**Problems of experimental statistics**).
Bol. Serv. Nac. Pesqu. Agron., Brasil 1950 : No. 7 : 43–90.

The results of an experiment carried out at Campos, Brazil, with two sugar cane hybrids, Co. 421 and CP 27.139, are used to illustrate the methods used for the statistical analysis of sugar production per hectare when sugar content does and does not vary with yield of cane, respectively. In the second case the following formula is proposed:

$$\sigma_z^2 = x^2\sigma^2{}_y + y^2\sigma^2{}_x + 2xy.\ Cov\,(x, y) - \sigma^2{}_x\,\sigma^2{}_y$$

where x and σ_x represent the yield of sugar cane and its standard error and y, σ_y, z and σ_z the values concerning the contents of sucrose and the yield of sugar cane per hectare.

*GENETICS

883. NAKAMORI, E.
(On the bulk breeding method as a breeding technique for self-fertilized plants).
Ikushugaku Zasshi / Jap. J. Breeding 1951 : **1** : 15–20. [Japanese].

After outlining the advantages of bulk breeding methods, the author derives formulae for the proportion of the individuals homozygous or heterozygous for a required genotype involving n allelomorphs. Special consideration is given to the stage at which selection should begin.

884. HOLMES, S. J.
Micromerism in biological theory.
Isis 1948 : **39** : 145–58.

The development of micromeristic theories involving hypothetical units in attempts to interpret the phenomena of generation and inheritance is traced from the early Greek atomists to the establishment of Mendelism. The success achieved in showing that all inheritance is essentially Mendelian and that segregation occurs by means of unit factors carried by the chromosomes "has caused the doctrine of micromerism, at least so far as the genes are concerned, to become an almost orthodox article of faith".

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* General studies, see also individual crops.

885. VON TSCHERMAK-SEYSENEGG, E.
The rediscovery of Gregor Mendel's work. An historical retrospect.
J. Hered. 1951 : **42** : 163–71.
A retrospective account of the rediscovery of Mendel's theories and other breeding work in progress at that time is given.

886. DICK, W. E.
The dilemma of Soviet science.
Discovery 1951 : **12** : 397–402.
The attitude of the Soviet State to scientific research is discussed; reference to Vavilov's organization of wheat and potato collections for breeding improved varieties, and to the genetics controversy is included.

887. PEI, H.
(The scientific basis of the new genetics).
Fukien Agric. J. 1950 : **11** : 125–45. [Chinese].
Arguments are brought forward in favour of Soviet genetics, the author maintaining that the distinction between hereditary and non-hereditary living material is invalid, that acquired characters may be inherited, and that recent work has discredited the notion of the particulate gene.

888. FRIMMEL, F.
Hofrat, Prof. Dr. Dr. h.c. Erich Tschermak-Seysenegg zu seinem 80.Geburtstag am 15.11.1951. **(Aulic Councillor, Prof. Dr. Dr. h.c. Erich Tschermak-Seysenegg on his 80th birthday, 15.11.51).**
Z. Pflanzenz. 1951 : **30** : 345–49.
In addition to the rediscovery of Mendel's paper, a number of practical achievements in plant breeding, including many wide crosses in cereals and the production of the dwarf oil pumpkin with soft-skinned seeds, together with extensive investigations on the biology of fertilization, are mentioned among the attainments of this distinguished scientist during over fifty years of genetical work.

889. **Genes and mutations.**
Nature, Lond. 1951 : **168** : 732–33.
An account is given of the symposium entitled "The genes and mutations", recently held at Cold Spring Harbor, Long Island.

890. BUZZATI-TRAVERSO, A.
The state of genetics.
Sci. Amer. 1951 : **185** : No. 4 : 22–25.
Comments are made on the meeting entitled Genes and Mutations, held by the Long Island Biological Association in Cold Spring Harbor, NY, during June 1951. The wide impact of recent genetical work upon other biological sciences is emphasized.

891. WEISZ, P. B.
A general mechanism of differentiation based on morphogenetic studies in ciliates.
Amer. Nat. 1951 : **85** : 293–311.
Evidence is presented in support of the view that the macronucleus contains many discrete subnuclei, each possessing a complete genome. Initially the subnuclei are equipotential. In certain species, however, differently located subnuclei undergo divergent fates during the vegetative cycle. Genic function is retained at some loci, but reduced or lost at others. In the course of macronuclear reorganization during fission, equipotentiality of all subnuclei is restored. Diversification of the subnuclear genomes, it is suggested, is brought about by the regionally correlated diversification of differentiated kinetosomes. Conversely the altered subnuclear pattern reinforces the particular ectoplasmic morphology. These effects are probably achieved by specific agents, presumably enzymes, synthesized both in the kinetosomes and subnuclei. This hypothesis may have some applicability to morphogenetical problems in multicellular organisms.

892. RILEY, H. P.
Gene frequencies and Mendelian ratios.
Amer. Nat. 1951 : **85** : 268–69.
Attention is drawn to the possible pitfalls of interpreting population ratios in terms of factorial analysis, Schütte's analysis of flower colour in *Romulea bulbocodioides* being criticized.

893. DIONIGI, A.
Il messaggio di un frumento. **(The message of a wheat).**
G. Agric. Domen. 1951 : **61** : p. 321.
The author's theory of how the developmental rhythm of a wheat may be advantageously altered (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2305) is elaborated to demonstrate the value of the new wheat M 5. Bred at the Rieti research station in Italy, the short strawed M 5 combines the resistance of a winter wheat to severe winter weather with the resistance of an early wheat to drought, rust and lodging.

894. KAUFMANN, B. P. and GAY, H.
Frequency of recessive lethals induced in *Drosophila* by near infrared rays and X-rays.
Anat. Rec. 1946 : **96** : 530–31. (Abst.).
Near infrared irradiation had no effect on the

frequency of recessive lethal mutations in *D. melanogaster*. About 7% lethals were induced by a dose of 3000 r. X rays; this percentage was not modified significantly by infrared treatment either before or after exposure to X rays.

895. Lu, H.
(The theory of heterosis and its utilization in crop breeding).
Fukien Agric. J. 1949 : **11** : 67–82. [Chinese].

A general review is given of theories of heterosis and the application of heterosis to plant breeding.

896. Ernst, A.
"Maternal hybrids" nach interspezifischen Bestäubungen in der Gattung *Primula*. I. Sektion *Candelabra*. **(Maternal hybrids from interspecific pollinations in the genus *Primula*. I. Section *Candelabra*).**
Arch. Klaus-Stift. VererbForsch. 1951 : **26** : 1–96.

The results of various interspecific crosses involving 12 species of the section *Candelabra* are reported. A number of interspecific combinations gave rise to progeny of the maternal type; since the possibility of accidental selfing was ruled out they were ascribed to diploparthenogenesis induced by the stimulus of pollination.

897. Michaelis, P.
Über die allgemeine Verbreitung plasmatischer Erbträger und ihre Bedeutung für die Entwicklungsphysiologie.
(On the widespread distribution of cytoplasmic hereditary factors and their significance for developmental physiology).
Ber. dtsch. bot. Ges. 1951 : **64** : 196–207.

This lecture contains a critical review of work on the role of the cytoplasm in heredity, from the following aspects: the widespread occurrence of cytoplasmic inheritance in plants and its possible occurrence in animals; cytoplasmic factors in reciprocal hybrids; the cytoplasm as autonomous living matter; the importance of the plasmon in ontogeny (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2313, and Vol. XXII, Absts 11 and 14); and plasmon changes in relation to age.

898. Cain, A. J. and Carter, G. S.
Non-adaptive or neutral characters in evolution.
Nature, Lond. 1951 : **168** : p. 1049.

The possible significance of genetic drift is briefly discussed in further correspondence (cf. Absts 907 and 910).

899. Pei, H.
(A statistical analysis of the elimination of recessive mutants).
Fukien Agric. J. 1949 : **11** : 7–24. [Chinese].

A mathematical analysis is presented of the frequency of recessive factors in segregating populations undergoing artificial selection for the dominant phenotype. After the nth hybrid generation of a cross between two lines involving m dissimilar factor pairs, the frequency P_m of homozygous dominant individuals, given that r^2 represents the proportion of homozygous recessives, is

$$Pm = \frac{(2)^m r\,[1 + (n-2)\,r^{\frac{1}{m}}]^m}{[1 + (n-1)\,r^{\frac{1}{m}}]^{2m}}.$$

If $r^2 = (\frac{1}{4})^m$,

$$P^m = \frac{(2n)^m}{(n+1)^{2m}}.$$

The frequency, R, of individuals homozygous for at least one recessive factor is

$$R = 1 - \left\{\frac{[1 + (n-2)r^{\frac{1}{m}}](1 + nr^{\frac{1}{m}})}{[1 + (n-1)r^{\frac{1}{m}}]^2}\right\}^m.$$

900. Lewis, D.
Structure of the incompatibility gene. III. Types of spontaneous and induced mutation.
Heredity 1951 : **5** : 399–414.

Four alleles of the incompatibility gene, S, in *Oenothera organensis* have been tested for mutations occurring spontaneously or after X irradiation (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 730). S_2 and S_3 have a zero mutation rate per 10^6 gene divisions, but spontaneous and induced mutations were recorded for the S_4 and S_6 alleles. Both permanent and revertible mutations were distinguished. All permanent mutations involved loss of the power to operate in the pollen; the stylar action, however, remained unaffected. Revertibility applies to mutations from the normal form to an unstable allele, which enables pollen grains to pass the incompatibility test at first, but soon reverts at a high rate to the normal active allele or to a stable inactive allele. X rays induced permanent and revertible mutations with equal frequency; the spontaneous occurrence of permanent

mutations was more rare than the occurrence of revertible types.
Constructive mutations to new and functionable incompatibility alleles were sought without success throughout the experiment; there is doubt whether mutations contributing to the evolution of a balanced genotype can be detected by the techniques employed.

901. ROTHE, H.
Morphologisch-entwicklungsgeschichtliche und genetische Analyse einer sich variabel manifestierenden Mutation von *Antirrhinum majus* L. (Analysis of the morphogenesis and genetics of a mutation of *A. majus* L. which varies in its manifestation).
Z. indukt. Abstamm.- u. VererbLehre 1951 : **84** : 74–132.
Descriptions are given of a number of seedling types with varying degrees of reduction of one of the cotyledons, resulting from partial fusion, which appeared in progenies of two mutants, styled *subconnata* I, arising from chemical treatment of race 50.
The different types occur in equal proportions in the progenies of all plants, regardless of their particular type, and selection for a given type did not alter their proportions. The mutant gene seems therefore to be variable in its manifestation, which was not, however, influenced by temperature. Though the two mutants differed slightly they proved to be allelomorphic. In crosses with the original or other normal types they were fully dominant and monofactorial segregation occurred in the F_2 in all but one of the crosses. Crosses with certain other monocotyledonous mutants showed that these were conditioned by different genes, named respectively *subconnata* II, III and IV. The phylogenetic significance of the *subconnata* I gene in connexion with the origin of the monocotyledons from dicotyledons by fusion of the cotyledons is indicated and the view is expressed that the monocotyledons are probably polyphyletic.

902. AUERBACH, C. and MOSER, H.
The effect of oxygen concentration on the mutagenic action of mustard gas.
Experientia, Basel 1951 : **7** : 341–42.
Oxygen has little effect on the mutagenic capacity of mustard gas in respect of frequency of sex-linked lethals in *Drosophila*. Comparative data on the frequency of X-ray-induced sex-linked lethals support the view that oxygen is involved specifically in the production of mutations by X rays.

903. ELTER, L.
La doctrine de Mitchourine comme base de la biologie scientifique. **(Mičurin's doctrine as the basis of scientific biology).**
Courrier Hort., Bruxelles 1951 : **13** : 306–08 ; 516–18.
The writer discusses Mičurin's views on the inheritance of variations as set out at the 1948 July-August Session of the Lenin Academy of Agricultural Sciences of the USSR (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2000).

904. GAUSE, G. F.
Problems of evolution.
Trans. Conn. Acad. Arts Sci. 1947 : **37** : 17–68.
Experimental proof of organic selection can be obtained by studying the acclimatization of protozoa to different salinities and temperatures. Reference is made to the superficial resemblance between genoadaptation and phenoadaptation. It was found that among different races of the same species the amount of modificational change in the form of acquired characters depends on the degree of genoadaptation already attained; relationship between these two processes is of a compensatory nature.

905. LEVITAN, M.
Locus of natural selection in an experimental population.
Va. J. Sci. 1951 : **2** : p. 315. (Abst.).
An equilibrium was established between two chromosomal variants of *Drosophila robusta* due to the differential survival of females, favouring natural selection of heterozygotes.

906. SAKAI, K.
(Studies on individual selection and selective efficiency in plant breeding).
Ikushugaku Zasshi / Jap. J. Breeding 1951 : **1** : 1–9. [Japanese].
The proportion d_g^R of homozygotes in the F_g hybrid generation, assuming that there are two linked alleles with a recombination value α on each of R chromosome pairs is given by

$$d_g^R = \left\{ \frac{2^{g-1} - 1}{2^{g-1}} + \left[\frac{\alpha^2 + (1-\alpha)^2}{2} \right]^g \right\}^R .$$

The selective efficiency E_r for independent genes is

$$E_r = \left(\frac{2^g - 1}{2^g + 1} \right)^r ,$$

where r is the number of independent alleles and assuming that the dominance of each gene is complete.

For the case of two linked genes per chromosome,

$$E_r = \left\{ 1 - \frac{2}{1 + 2^{g-1}\left[1 + \lambda_1^g - \frac{\lambda_2(1 - \lambda_2^g)}{1 - \lambda_2} \right]} \right\}^R,$$

where $\lambda_1 = \frac{(1-\alpha)^2 + \alpha^2}{2}$ and $\lambda_2 = \frac{(1-\alpha)^2 - \alpha^2}{2}$.

For independent genes, the ratio D_r between the number of phenotypic dominants and the selective efficiency is given by $E_r = D_r^{K_1}$, while the ratio D_R, for two linked genes per chromosome, is given by $E_r = D_r^{K_2}$, where

$$K_1 = \frac{log_{10}\left(\frac{2^g - 1}{2^g + 1}\right)}{log_{10}\left(\frac{1}{2} + \frac{1}{2^g + 1}\right)},$$

$$K_2 = \frac{log_{10}\left(1 - \frac{2}{2^{g-1}\Delta}\right)}{log_{10}\left(\frac{1}{2^g + 1} + \frac{\Delta}{4}\right)},$$

Δ representing

$$1 + \lambda_1^g - \frac{\lambda_2(1 - \lambda_2^g)}{1 - \lambda_2}.$$

The number n of phenotypically dominant individuals which should be selected in order to include at least one homozygote is

$$n \geqslant \frac{log_{10}\, 0.01}{log_{10}\,(1 - E)},$$

where E is the selective efficiency, and the chances of failure are assumed to be less than 1 in a 100. The minimum size N of a hybrid population in which the chances of failure to obtain at least one homozygous dominant are not greater than 1 in a 100 is

$$N \geqslant \frac{log_{10}\, 0.01}{log_{10}\,(1 - D^{k+1})}.$$

Computed values are given for d_g^R when $R = 1$, 5 and 10, $\alpha = 0$, 0·1 and 0·3, during the F_2 to F_{10}, for E_r, for D_r, D_R, K_1 and K_2, and for n and N.

These calculations suggest that, when many genes are concerned, selection is likely to be ineffectual in the early generations. Individual selection should therefore be delayed until later generations, a large bulk population being carried over through the F_2 and F_3 until selective efficiency improves in the later generations.

EVOLUTION

907. CAIN, A. J.
So-called non-adaptive or neutral characters in evolution.
Nature, Lond. 1951 : **168** : p. 424.

The author advocates a cautious approach in assuming that variation is sometimes non-adaptive or random. Citing examples mainly from the animal kingdom, he maintains that upon proper scrutiny every supposed case of random variation has been found to be non-random.

908. CRONQUIST, A.
Orthogenesis in evolution.
Res. Stud. St. Coll. Wash. 1951 : **19** : 3–18.

The following hypothesis on the mechanism of orthogenesis is presented. A gene or gene complex for mutability in other genes may produce a series of progressive mutations, giving rise to nonadaptive or orthogenetic trends, if the mutation rate exceeds the rate at which the mutants are eliminated by natural selection. Long-continued neutral or contraadaptive mutational pressure acting upon certain genes may ultimately exert very considerable effects within a population, in combination with other influences, e.g. multiple trends may at some stage acquire survival value, orthogenetic and Darwinian effects thus reinforcing one another. Conversely, natural selection of favourable mutations occurring in a few individuals may result in a population tending to mutate in a certain direction, the orthogenetic and Darwinian effects again thus being combined. An orthogenetic impetus may frequently push the trend beyond the point of survival value. The general tendency of useless structures to degenerate may be regarded as a special type of orthogenesis, due to the frequency of degenerative or loss mutations. Evolutionary trends in the Compositae are discussed in relation to this hypothesis; it is suggested that many evolutionary trends in this family can only be explained according to the concept of orthogenesis.

909. VESELOVSKIĬ, V. B.
(Some suggestions for a course of Darwinism).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 3 : 78–80. [Russian].

Despite recent developments in Soviet biology, the works of Mičurin and Pavlov continue to be referred to only incidentally in syllabuses and textbooks of biology. Soviet biology and medicine differ fundamentally from "classical"

biology; the work of Darwin, however admirable as an episode in the history of evolutionary science, is now of historical interest only. The works of Mičurin and Pavlov, and of their successors, are considered as more than an extension of hitherto existing biological knowledge: they form a new theory of organic development.

910. CARTER, G. S.
Non-adaptive characters in evolution.
Nature, Lond. 1951 : **168** : 700–01.

The view expressed by A. J. Cain (cf. Abst. 907) that all characters should be assumed to have selective value is criticized. It is argued that cases of nonadaptive evolution should be regarded as at least theoretically possible until further knowledge is gained.

911. JONES, D. F.
The cytoplasmic separation of species.
Proc. Nat. Acad. Sci., Wash. 1951 : **37** : 408–10.

Cases of matroclinous inheritance in plants are discussed. The view is expressed that the cytoplasm as well as the genic constitution is involved in the separation of species; whether the cytoplasmic factors concerned are the result of the nuclear differences is not yet known.

912. HOWARD, H. W.
The so-called chromosome-races of *Cardamine pratensis* and *Nasturtium officinale*.
Nature, Lond. 1951 : **168** : 477–78.

A communication by G. Haskell on chromosome races and their ecology in Great Britain is criticized (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2361). In the case of watercress, attention is drawn to the fact that the forms referred to by Haskell as chromosome races have been shown by the author and I. Manton to be two distinct species and an allopolyploid, viz. *N. officinale* ($2n = 32$), *N. microphyllum* or *N. uniseriatum* ($2n = 64$), and *N. microphyllum* x *N. officinale* with $2n = 48$ (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1257).

913. Lunds Universitets Årsberättelse 1949–1950. (**Annual report of Lund University, 1949-50**).
Lund 1951 : Pp. 114.

The following points from the report of the Botanical Institute of Lund University (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1499) are of interest to plant breeders. Heribert Nilsson continued his work on species formation in *Salix*, while the origin and early history of certain crop plants and weeds was further investigated by H. Hjelmqvist.
Papers published by the Genetics Institute of the University in *Hereditas*, Vol. 36 (1950), have been already summarized in *Plant Breeding Abstracts*, Vol. XX, No. 3.

*CYTOLOGY

914. KHRUSHCHOV, G. [HRUŠČOV, G.]
New developments in cell theory. A significant discovery of the Soviet biologist O. B. Lepeshinskaya.
J. Hered. 1951 : **42** : 121–22.
NACHTSHEIM, H.
Biological phantasies. New developments in the case of Lysenko.
Ibid. 1951 : **42** : 122–23.

Translations are given of articles from Berlin newspapers. Hruščov provides a laudatory account of Lepešinskaya's work on the origin of the cell (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2056 and Vol. XXI, Abst. 1509) and attacks the hypotheses of Virchow. Nachtsheim, in criticizing the theories of Lepešinskaja, points out that they constitute a return to the views of Schleiden and Schwann in the 1830's and refers to criticism of her earlier investigations by the Russian biologist N. K. Koltzoff [N. K. Koljcov] in 1934.

915. LEPEŠINSKAJA, O. B.
(**The materialist theory of the cell**).
Agrobiologija (Agrobiology) 1951 : No. 2 : 3–26. [Russian].

A report, read at a meeting of the Lenin Academy of Agricultural Sciences, on investigations into the origin of cells (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1509), is presented in an abridged form. It contains some evidence, supported by microphotographs, of animal cells originating from noncellular proteins. The material studied included yolk corpuscles of the eggs in the hen, canary and fish and the proteins of protozoa.

916. LYSENKO, T. D.
(**The research of the member of the Academy of Medical Sciences of the USSR, O. B. Lepešinskaja**).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 10 : 3–5. [Russian].

The investigations of Lepešinskaja (cf. *Plant*

* General studies, see also individual crops.

Breeding Abstracts, Vol. XXI, Abst. 1509) are considered important contributions to the study of ontogeny and phylogeny. The evidence obtained in her experiments that cells may originate from simply organized proteins agrees with Mičurinite theories on conversion, caused by external conditions, of some plant species into other species. Several examples of conversion of one cereal into another are mentioned.

917. Horvat, Ja. [Horvath, J.]
(Physiological and genetical investigations of a soil protozoon deprived of its micronucleus).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 1 : 81–88. [Russian].

In experiments at the Hungarian Research Institute of Biology, Tihany, micronuclei were eliminated in *Kalia simplex* by ultraviolet irradiation. This elimination did not interfere with parthenogenesis and conjugation.

918. Gottschalk, W.
Das Verhalten der Nucleolen während der Meiosis von *Solanum lycopersicum*. **(The behaviour of the nucleoli during the meiosis of *S. lycopersicum*).**
Chromosoma, Berlin 1951 : 4 : 503–20.

During zygotene and pachytene in *S. Lycopersicon* the nucleolus ultimately divides into two similarly shaped halves. During pachytene the normal condition is restored, without loss of matter or formation of new substance. In the first and second interphase 3–4 nucleoli are formed in the haploid nuclei, so that other chromosomes in addition to the satellite chromosomes must be able to form nucleoli. In X-irradiated pollen mother cells, though the nucleoli may not disappear, re-formation of the nucleoli in the dyad and tetrad nuclei proceeds normally.
Eleven other species of *Solanum*, *Nicandra physaloides* and three species of *Physalis*, showed similar changes affecting the nucleolus but in other *Solanum* species and in *Atropa*, *Capsicum*, *Datura*, *Hyoscyamus* and *Nicotiana* a divided nucleolus in prophase was very rarely seen or was absent.

919. Tandler, C. J.
Empleo del acetato de plomo como reactivo citoquímico. **(The use of lead acetate as a cytochemical reagent).**
Ciencia e Investigación, B. Aires 1951 : 8 : 427–28.

A technique for staining nucleoli is described involving fixation in lead acetate and subsequent treatment with ammonium sulphide.

920. Salord, J.
The action of temperature on the chromosomic structure of *Trillium*.
Portug. Acta Biol. 1949 : 2 : 337–63.

The influence of high and low temperatures upon chromosome structure during mitosis was analysed in several species of *Trillium*. The temperature limits within which mitosis remained normal and chromosome contraction was independent of the temperature varied interspecifically and within the same species among individual plants differing in size. The temperature range within which an abnormal condition of chromatic agglutination was observed also varied from species to species. In one plant of *T. sessile*, a temperature of 90° C for 6 hours resulted in intense splitting of the chromosomes, in addition to agglutination. In *T. ovalum*, nucleolar and enucleolar olistherochromatic zones could be distinguished, as a result of differential response to ordinary and low temperatures. Chromatic rarefaction at high and low extremes of temperature bore no connexion with that characterizing normal mitoses at low temperature. The possible nature of cases of "accidental olistherochromatin" observed in metaphases of *T. luteum* at various temperatures is discussed with reference to identical results obtained by Resende and other investigators.

921. Sáez, F. A.
Cómo se comporta el ácido nucleico durante la división celular? **(How does nucleic acid behave during cell division?)**
Ciencia e Investigación, B. Aires 1951 : 8 : 411–13.

Recent work on the behaviour of nucleic acid during the mitotic cycle is reviewed.

922. Wilson, G. B., Hawthorne, M. E. and Te May Tsou.
Spontaneous and induced variations in mitosis.
J. Hered. 1951 : 42 : 183–89.

Investigations concerning the frequency and nature of somatic reductional mitoses in normal root tips of *Allium Cepa* and in root tips treated with cyclochlorohexane or actidone failed to reveal specific relationships between treatment and mitotic abnormalities. After chemical treatment there was a slight increase in the frequency of multipolar anaphases giving rise to multinucleate cells containing nuclei with

reduced chromosome numbers, and split metaphase and anaphase configurations potentially capable of both chromosome reduction and genetical segregation. Initial separation was generally at right angles to that normally observed with respect to the spindle. In contrast to the assumption that the spindle exists as a single unit in the mitotic mechanism, it is suggested that at least two forces are involved: the dipolar cytoplasmic orientation characteristic of the cell at any stage and a nuclear component inherent in the chromosome or kinetochore; while metaphase is primarily a function of the cytoplasmic component, anaphase can be considered a function of the chromosome itself. Thus, split figures represent a degree of weakness in cytoplasmic orientation, multipolar anaphases result from a complete breakdown of cytoplasmic orientation without interference with the nuclear component, and totally disorganized nuclei indicate the failure of both mechanisms.

923. Ferreira, M., Rezende-Pinto, M. C. de, and Lemos-Pereira, A. de
About the "Lusomicine's" action at distance upon the synthesis of the nucleoproteins.
Portug. Acta Biol. 1949 : Ser. A : **2** : 377–82.

Bulbs of *Allium Cepa* were injected in the median region with Lusomicine. The substance only affected nuclei of the meristematic cells in the roots, and probably interfered with nucleoprotein synthesis, since a progressive chromatic rarefaction was observed during mitosis, ending in total destruction of the nucleus and in cell necrosis.

924. D'Amato, F.
The quantitative study of mitotic poisons by the *Allium Cepa* test: data and problems.
Protoplasma 1950 : **39** : 423–33.

A general review is given of research carried out since 1946 at Svalöf, Sweden, and at the University of Pisa, using *A. Cepa* as material for investigating the series of cytological effects, culminating in c-mitosis, caused by numerous chemicals.

925. Resende, F.
Normal and abnormal metabolism, the cause of mutations. The origin of cancer.
Portug. Acta Biol. 1950 : **3** : 109–45.

The author discusses the cytogenetical work carried out by himself and his colleagues since 1937 to study the origin of chromosomal and genic mutations in somatic cells. The general conclusion is reached that both types of mutation, whether spontaneous or induced, are caused by disturbances in cell metabolism. Spontaneous and induced physiological disturbances in the cell can be detected in the form of variations in chromosome morphology, abnormal behaviour of the nucleoli during mitosis, and coalescence between chromosomes and between chromatids resulting from an abnormal condition of the calymma or matrix.

The mutagenic chemical substances formed during abnormal metabolism may arise in the cytoplasm, nuclear fluid, nucleoli or calymma. The chromonemata become vulnerable to the deleterious effect of the metabolic changes through proximity with the calymma (cf. Abst. 925). This deleterious effect occurs during interphase as well as mitosis.

As a consequence of chromatic agglutination between chromosomes, despiralization may arise, and therefore, chromosome distension and calymmatic rarefaction; in this way interchromosomal differences in size and also variation in Feulgen reaction originate. Agglutination between chromatids may cause pseudobridges, with symmetrical and asymmetrical distensions. In the latter case, a true bridge may remain after the state of agglutination has come to an end. At telophase such bridges are indistinguishable from those produced by fusion of chromonemata, without a fragment. Distension bridges are more prone to rupture than fusion bridges.

In addition to such so-called pathological disturbances, functional physiological changes, normally related to the developmental physiology of tissue differentiation, may give rise to genomic changes, i.e. endopolyploidy and aneusomaty, through endodivision, endomitosis and intense chromatic agglutination.

The modification in percentages of mutations obtained with successive applications of mutagenic agents is regarded as proving that the cause of mutation resides in physiological changes.

Examination of the results of investigations on cancer or tumour formation in animals and plants leads to the view that such abnormal growth also has its origin in somatic mutation, caused by metabolic disturbances. Without a suitable internal environment, the genetically determined capacity for pathological growth remains a potentiality. The production of this appropriate environment may or may not be directed by the genes conditioning normal and

abnormal growth. Extracts from cancerous cells of plants and animals are termed carcihormones. These substances act as agents which transform normal cells into cancerous tissues by promoting differentiation or mutation.

926. Pinto-Lopes, J. and Resende, F.
The role of the chromatic agglutination in the origin of mutations.
Portug. Acta Biol. 1949 : Ser. A : **2** : 325–35.

As an outcome of investigations mainly on root tips of *Haworthia*, the authors develop further a hypothesis on the role of chromatic agglutination in the production of chromosome aberrations in somatic cells. Once the calymma or matrix undergoes chromatic agglutination, resulting from depolymerization and other unknown chemical changes, the protection afforded by the normal calymma to euchromatic and heterochromatic chromonemata is reduced or obliterated. The chromatic agglutination of the calymma is often interchromosomal, bringing heterologous chromosomes into proximity. This condition, coupled with the lack of calymmatic protection, may lead to the agglutination of the chromonemata themselves, and thus to various structural alterations of the chromosomes, when the abnormal condition of agglutination ceases.

927. Vorbrodt, A.
L'action des dérivés du pyrazolone sur les divisions mitotiques et sur le métabolisme de l'acide thymonucléique dans les meristèmes des racines de *Allium cepa* L. et de *Phaseolus multiflorus* Willd. (**The action of derivatives of pyrazolone on mitotic divisions and on thymonucleic acid metabolism in the root meristems of *A. cepa* L. and *Ph. multiflorus* Willd**).
Bull. Int. Acad. Cracovie 1950 : Sér. B : No. 4–10 : 177–96.

Caspersson's theory on the role of nucleic acids in the cell was corroborated by the author's experiments which demonstrated (1) the relation between the inhibition of nucleic acid metabolism and mitotic disturbances in the cell; and (2) the importance of desoxyribonucleic acid in cell division. Defective enzyme action may, it is thought, be the cause of the anomalies observed and of the disturbances in the thymonucleic acid and activity in the cell.
If the action of the pyrazolone derivatives on the tissues is interrupted and normal conditions are re-established, the mitotic disturbances disappear.

928. Lang, K., Siebert, G. and Estelmann, W.
Hemmung der Adenosintriphosphatase durch Colchicin. (**Inhibition of adenosinetriphosphatase by colchicine**).
Experientia, Basel 1951 : **7** : 379–80.

On testing the hypothesis that adenosine triphosphatase activity, which is inhibited by certain concentrations of colchicine, was also a causal factor of cell spindle contraction, the writers found no evidence to show that the breaking down of adenosine triphosphate supplies the necessary energy for the spindle-blocking action of colchicine.

929. Sampayo, T. M., Castro, D. and Gardé, N. M.
Observações sobre a autotetraploidia induzida pela colquicina em *Luzula purpurea* Link. (**Observations on autotetraploidy induced by colchicine in *L. purpurea* Link.**).
Agron. Lusitana 1951 : **13** : 1–11.

Three tetraploid plants ($2n = 24$) were obtained by colchicine treatment. Various anomalies were observed at the reduction division but the majority of the pollen mother cells developed regularly and gave rise to normal microspores, which in most cases contained 6 chromosomes.

930. Lettré, H. and Albrecht, M.
Über die Abhängigkeit der Colchicinwirkung von der Adenosintriphosphorsäure. (**The dependence of the colchicine effect on adenosine triphosphoric acid**).
Naturwissenschaften 1951 : **38** : 547–48.

Adenosine triphosphoric acid had an effect antagonistic to that of colchicine in fibroblast cultures, suggesting a relationship between the colchicine effect and the mechanism of muscular contraction.

931. Lübbert, G.
Vergleichende cytologische, morphologische und physiologische Untersuchungen innerhalb der Gattung *Diplotaxis*. (**Comparative cytological, morphological and physiological investigations in the genus *Diplotaxis***).
Beitr. Biol. Pfl. 1951 : **28** : 254–95.

During the last few centuries this genus has extended its natural area of distribution from the Mediterranean as far as northern Scandinavia. *D. muralis* is particularly successful in the northern latitudes and unfavourable habitats such as chalky and saline soils. Cytological examination showed it to be a polyploid

species, with $2n = 44$ as compared with $2n = 22$ in *D. tenuifolia*, $2n = 18$ in *D. catholica* and $2n = 14$ in *D. erucoides*.
Meiosis was regular in all species, and none had more than one nucleolus. The aneuploid series has probably arisen in a manner analogous to that in the related genera *Cardamine* and *Brassica*. The chromosomes were smaller in *D. muralis* and the nuclear volume greater than in the other species; the range of variation in growth habit and other vegetative characters was much wider and this evidently accounts for the greater adaptability of the species. In characters such as size of cell, nucleus, pollen grain and seed no difference was observed within the species; even the two extreme ecotypes classed as *major* and *minor*, when grown under similar conditions, proved identical; their chromosome number was the same, and they are clearly only environmental modifications.
Attempts to produce polyploids of *D. muralis* by colchicine treatment failed because the plants produced were mixoploid and the growing points developed only from undoubled cells.

932. Brown, R.
Isolation of nuclei from plant cells.
Nature, Lond. 1951 : **168** : 941–42.
A pectinase treatment is described by means of which it has been possible to obtain suspensions containing free nuclei from onion root tips.

933. O'Brien, J. A. (Jun.).
Plastid development in the scutellum of *Triticum aestivum* and *Secale cereale*.
Amer. J. Bot. 1951 : **38** : 684–96.
No evidence was obtained of the development of plastid aggregations from mitochondria. Results of investigations indicate that the nucleus controls the formation of new plastids to take the place of those which are apparently digested after temporarily storing starch; the new plastids arise in cytoplasm adjacent to the nucleus.

934. Cave, M. S. and Pocock, M. A.
Karyological studies in the Volvocaceae.
Amer. J. Bot. 1951 : **38** : 800–11.
Mitotis in five genera of the Volvocaceae appears to resemble that of higher plants. In *Volvulina Steinii*, colonies having either 7 or 8 chromosomes indicate the possibility of sexual differentiation. Colonies of another genus possess either 4 or 8 chromosomes, suggesting either polyploidy or an alternation of diploid and haploid generations. The most primitive genus, *Gonium*, has the largest number of chromosomes, and reduction in chromosome complement was traced from primitive to advanced species of *Volvox*.

*DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

935. Seeliger, H.
A variant of *Escherichia* resembling a mannitol-fermenting *Shigella*.
J. Bact. 1951 : **62** : 243–44.
An anaerogenic mannitol-fermenting strain of *E. coli*, isolated at Palermo, Sicily, presumably arose by mutation.

936. Eigelsbach, H. T., Braun, W. and Herring, R. D.
Studies on the variation of *Bacterium tularense*.
J. Bact. 1951 : **61** : 557–69.
Changes in virulence and immunogenic properties are frequently associated with variation in colonial form attributed to the establishment of spontaneously arising mutants. The latter increase at the expense of the original parent type when factors such as pH and composition of the medium create a selection pressure in their favour.

937. Jordan, W. E., Mefferd, R. B. and Wyss, O.
The radiation dose-response curve and bacterial mutations.
Science 1951 : **114** : 436–37.
The effect of number of survivors upon the incidence of end-point mutations to streptomycin resistance induced by ultraviolet irradiation of *Bacillus anthracis* is discussed.

938. Baskett, A. C. and Hinshelwood, C.
The mechanism of the training of *Bact. lactis aerogenes* to D-arabinose.
Proc. Roy. Soc. 1951 : **139** : No. 894 : 58–73.
Further studies on the adaptation of *B. lactis* var. *aerogenes* to d-arabinose (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 114) have given the following results: the lag preceding colony formation by an unadapted strain on a solid medium is never less than that observed in a liquid culture; the presence of untrained cells does not inhibit the division of adapted cells; the growth curve is not characteristic of a

* General studies, see also individual crops.

simple mixture of normal bacteria and mutants; at the end of the long lag phase the bacterial mass increases before any detectable increase in cell number occurs; and in favourable conditions every cell present can become adapted. In the early stages of adaptation, no stable adapted strains can be isolated, and addition of glucose results in complete reversion to nonadaptation. In artificial mixtures of fully adapted and untrained cells in a glucose medium, there is no selective advantage in favour of the normal cells. There is, therefore, no evidence for the presence of both normal cells and mutants in partially adapted cultures. It is assumed that direct interaction between the cell and the new medium induces gradual development of an alternative metabolism involving different enzymes; the lag phase represents the time during which intermediate substances are being elaborated by unaccustomed processes.

939. HETTENBACH, U. and LUDWIG, W.
Induzierte Inversion der Asymmetrieform bei *Bacillus mycoides* Flügge. (**Induced inversion of the "asymmetry" form of *B. mycoides* Flügge**).
Experientia, Basel 1951 : **7** : 457–59.

B. mycoides grows in counterclockwise and in clockwise colonies, the latter being probably selected mutant stocks from the counterclockwise type which is probably the wild form. Single spontaneous mutations of R → L and of L → R have been observed.

By culturing once on agar containing optically active substances the rotation could be inverted either temporarily or as a dauermodification in 100% of the stock.

The original L strains are probably inverted only by nonnatural isomers, while the R strains resulting from mutation are inverted only by natural isomers. Strains appear to differ in their R–L stability in regard to various optically active substances used in culturing.

940. DELAMATER, E. D. and HUNTER, M. E.
Preliminary report of true mitosis in the vegetative cell of *Bacillus megatherium*.
Amer. J. Bot. 1951 : **38** : 659–62.

Evidence of true mitosis in the vegetative haploid phase of *B. megatherium* is presented. Three chromosomes were identified in each nucleus at prophase; centrioles or polar granules were distinguished at prophase and until telophase. Preliminary studies have also revealed the occurrence of true mitosis in *Escherichia coli* and other bacteria.

941. PLOUGH, H. H., MILLER, H. Y. and BERRY, M. E.
Alternative amino acid requirements in auxotrophic mutants of *Salmonella typhimurium*.
Proc. Nat. Acad. Sci., Wash. 1951 : **37** : 640–44.

Six types of alternative aminoacid requirements have been recognized among auxotrophic mutants induced by radiation. The requirements are essentially similar to those found in *Neurospora* and *Escherichia*. Auxotrophs of *S. typhimurium* requiring various sulphur compounds are surveyed. No group is able to use sulphate. All the groups can be interpreted in terms of the hypothesis of one gene to one enzyme, except in the case of two groups. One of these is able and the other unable to utilize sulphide; the failure of both groups to use methionine is explained in terms of a suppressor action.

942. WRIGHT, B. E.
Enhancement of the normal reversion-rate of a serineless *Escherichia coli* mutant by certain organic acids.
Nature, Lond. 1951 : **168** : 1087–88.

The normal back-mutation rate of a mutant requiring either serine or glycine was considerably increased in the presence of 3–phosphoglyceric, glyceric, lactic, tartaric or malic acids. These acids do not serve as substitutes for serine but share the configuration $\begin{matrix}(COOH)\\|\\(CHOH)\\|\end{matrix}$ ·

943. MCDONALD I. J. and FRAZIER, W. C.
Variation in morphology of colonies of lactobacilli.
J. Bact. 1951 : **61** : 627–37.

Both stable and unstable types of smooth variant colonies are produced by rough strains of *Lactobacillus lactis* and *L. helveticus*. The stable type appears spontaneously and successive selection yields cultures with a high percentage of smooth colonies; these can be maintained in the smooth state indefinitely. Unstable variants appear only under certain environmental conditions and revert to the parent type when the specific conditions required for their establishment are removed. It is emphasized that use of colonial criteria to determine the dissociative stage of a culture may therefore prove misleading if it is assumed that a colonial variant has distinctive physiological and biochemical properties.

944. OGINSKY, E. L., SMITH, P. H. and UMBREIT, W. W.
The action of streptomycin on the respiration of *Streptomyces griseus*.
J. Bact. 1951 : **61** : 639–42.

Marked differences were observed between the oxidation capacity of a strain of *S. griseus* producing streptomycin and that of a mutant strain derived from the former but unable to produce the antibiotic. The rates of oxidation characteristic of both strains were affected by streptomycin.

945. LEDERBERG, J.
Streptomycin resistance: a genetically recessive mutation.
J. Bact. 1951 : **61** : 549–50.

Diploid hybrids resulting from a cross between two polyauxotrophic mutants of *Escherichia coli* K 12, W 67 and W 1177, proved heterozygous for factors controlling reaction to streptomycin; susceptibility was clearly dominant over resistance.

946. ENGLISH, A. R. and MCCOY, E.
Growth comparisons of streptomycin-sensitive and streptomycin-resistant *Micrococcus pyogenes* var. *aureus*.
J. Bact. 1951 : **62** : 19–26.

Resistant mutant strains proved capable of more rapid and profuse growth in a semi-synthetic medium than their susceptible parent. Addition of biotin to the medium increased the growth of the streptomycin sensitive parent to a degree comparable with that of the streptomycin resistant mutants.

947. KRASILJNIKOV, N. A., KORENJAKO, A. I., NIKITINA, N. I. and SKRJABIN, G. K.
(Intraspecific and interspecific relations between antagonistic microorganisms and the principles for determining species).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 4 : 66–80. [Russian].

Antagonistic relations between 1500 cultured strains of *Actinomyces* and 500 strains of bacteria were investigated. It was found that competition by means of antibiotics occurred only between different species.

948. FREEMAN, V. J.
Studies on the virulence of bacteriophage-infected strains of *Corynebacterium diphtheriae*.
J. Bact. 1951 : **61** : 675–88.

Virulent strains of *C. diphtheriae* were isolated from four avirulent cultures after incubation with a specific phage B filtrate by which they were readily lysed. All variants proved stable, lysogenic and resistant to phage B. It is suggested that the virulent mutants arose spontaneously and phage lysis facilitated their selection.

949. COHEN, S. S.
The synthesis of nucleic acid by virus-infected bacteria.
Bact. Rev. 1951 : **15** : 131–46.

Research concerning the synthesis of virus components, particularly virus nucleic acid, is summarized. Data on the infection of *Escherichia coli* with three phages, T2, T4 and T6, indicate that virus polymers are synthesized in stages by the enzymes of the host according to the specific nature of the infecting virus particle. Two alternative hypotheses which may account for the transfer of desoxyribose nucleic acid (DNA) from host to virus are considered: (*a*) that a genetically determined specific fragment of DNA from the host is incorporated into the virus, or (*b*) that DNA within the host undergoes degradation to substances such as nucleosides prior to resynthesis as DNA within the virus. Experimental results favouring the latter are presented.

950. BROWN, J. S.
The effect of photoreactivation on mutation frequency in *Neurospora*.
J. Bact. 1951 : **62** : 163–67.

The high frequency of ultraviolet-induced reverse mutations at the inositol locus of *N. crassa* (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1646) was lowered by immediate subsequent exposure to visible light. The reduced rate, although less than in survivors of ultraviolet irradiation subsequently kept in the dark, was above the original spontaneous mutation frequency.

951. MATHIESON, M. J.
Genetics of spore characters in Ascomycetes.
Abstr. Diss. Univ. Camb. 1949–50 (1951) : 33–34.

Results of investigations using a number of morphological mutants of *Chromocrea spinulosa* have shown that difference in spore size is a pleiomorphic expression of mating type, the fungus being heterothallic.

At the first division spindle of ascospore formation in *Bombardia lunata*, the bias on segregation of the chromosomes bearing factors affecting spore colour was found to be less than that shown in Zickler's data (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 16) for the *rubiginosa* locus; a

similar bias was observed for *lactea*. Data on segregation in the second division also differ from those of Zickler, but since the linear order of nuclei in the ascus after the second division is determined by chance rather than spindle orientation, it is unlikely that this bias is genetically controlled. It was shown that neither maturity of the perithecium nor chromosomal differences could account for the degree of polarization in the first division. Abnormal arrangements of the ascospores in the ascus result from mutation during meiosis of the zygotic nucleus.

952. LEIN, J., APPLEBY, D. C. and LEIN, P. S.
Acetate formation in *Neurospora* studied with biochemical mutants.
Arch. Biochem. Biophys. 1951 : **34** : 72–80.

During a search for *Neurospora* mutants requiring fatty acids, two acetate requiring mutants, S–34 and S–53, were isolated; both can obtain acetate by degradation of various fatty acids. Results of genetic studies show that the acetate requirement segregates in a typical Mendelian manner, and that mutations of different genes are responsible for the origin of the two mutants.

953. WAGNER, R. P. and HADDOX, C. H.
A further analysis of the pantothenicless mutants of *Neurospora*.
Amer. Nat. 1951 : **85** : 319–30.

The pantothenicless mutants 5531 and 34556 (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 163 and Abst. 2424) were active in the synthesis of pantothenic acid *in vivo* when the cultures were aerated. When 5531 was crossed with mutants UT 1 or UT 39, the double mutant did not require pantothenic acid for growth. The bearing of these results upon the analysis of genetic blocks is discussed.

954. FINCHAM, J. R. S.
Genetic and biochemical studies on *Neurospora*.
Abstr. Diss. Univ. Camb. 1949–50 (1951) : 40–41.

By hybridization between *N. crassa* and *N. sitophila*, mutant genes linked with genes determining mating type in each species were transferred to the other species; comparative chromosome maps were made. In both species the two mating type chromosomes are largely homologous; *N. sitophila* has a higher chiasma frequency than *N. crassa* in the centromere region, but the frequency is similar in the distal regions (*Plant Breeding Abstracts*, Vol. XXI, Abst. 1639).

A chromosome number of $n = 7$ is reported for *N. sitophila*, three strains of *N. tetrasperma* and another strain which may constitute a new species. Several mutant strains of *N. crassa*, requiring aminoacids as growth factors, were investigated; two strains which grow if supplied with one of a number of l-amino acids may represent mutations at the same locus (*Plant Breeding Abstracts*, Vol. XX, Abst. 807 and Vol. XXI, Abst. 20).

955. SUBRAMANIAM, M. K.
Whither yeast genetics?
Curr. Sci. 1951 : **20** : 257–59.

The use of spore germination, cell size and shape, mating types and sporulation by Winge and Laustsen and other investigators as criteria of haploidy is criticized. In the author's view, dependence on morphological characters and neglect of cytological evidence have led to neglect of the possibility that polyploidy occurs and thus to erroneous interpretations of irregular segregation ratios and other phenomena.

956. THORNE, R. S. W.
The genetics of flocculence in *Saccharomyces cerevisiae*.
C.R. Lab. Carlsberg, Copenhagen 1951 : **25** : Sér. Physiol. 101–40.

Hybridization was undertaken with comparative ease, using the spore-crossing method devised by Winge and Laustsen, between five English strains of brewers' yeast, *S. Chevalieri* and the American "yeast foam" strain of *S. cerevisiae*; both the latter were included to increase the germinating capacity of hybrid spores. All except one English strain (K) were nonflocculent yeasts.

Preliminary crosses between K and other types indicated that flocculence is a genetically controlled character dominant to nonflocculence. Segregation of flocculent and nonflocculent types in the F_2 and back cross progenies gave evidence of a polymeric system of not less than three genes, F_1, F_2 and F_3, and the probable existence of an inhibiting gene. Genotypes possessing only F_1 or F_2 have already been isolated; crosses between such types gave characteristic segregations for both genes. Hybrids between a yeast with only recessive genes and a type with either F_1 or F_2 produced offspring in the ratio of 2 flocculent: 2 nonflocculent; crosses between genotypes with a common F gene gave all flocculent progeny. The control of flocculence shows similarity to the system of four polymeric genes determining maltose fermentation (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1652) and provides

additional evidence for Mendelian inheritance in the Saccharomycetaceae.

Evidence was obtained of a gene *D* for diploidization (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2431); hybrids 15 and 18, which produced asci containing both haploid and diploid spores, were presumably heterozygous (*Dd*). All six possible crosses between the four diploid cultures derived from a single homozygous ascus (*DD*) produced fertile ascospores, thus confirming the absence of mating types in some hybrids. During the investigation a high rate of spontaneous mutation from *F* to *f* was obvious. Approximately 6% of the theoretically flocculent types mutated to the recessive form; this did not, however, prevent the determination of segregation ratios. X irradiation by 22,500 r. had no effect on the rate of spontaneous mutation from *F* to *f*; doses of up to 45,000 r. failed to induce back mutation in recessive cultures. Only a single spontaneous mutation from f_1 to F_1 was recorded.

Information on the parentage of 107 hybrids produced in the course of these experiments is presented.

957. Krishna Murthy, S. N. and Subramaniam, M. K.
Further observations on reverse mutations in yeasts.
J. Indian Inst. Sci. 1950 : **32** A : 1–28.

Yeast colonies studied during different months consisted of mixtures of mutants varying in sculpturing. The establishment of the different mutants appeared to depend on the temperature; possibly also each mutant varied in its growth rate according to the season. The changes in population are not therefore regarded as adaptive. Back mutants were obtained in all cases, an observation considered as proof that gene mutation is the origin of the variation. The classification of yeasts into haplontic and diplontic forms is criticized on the basis of evidence of the occurrence of tetraploidy.

958. Subramaniam, M. K., Ranganathan, B. and Krishna Murthy, S. N.
Reverse mutations in yeasts.
Cellule 1948 : **52** : 37–60.

A reverse mutation from a radially ridged colonial form of *Saccharomyces cerevisiae* BY 4 to a rough type and later to a completely smooth colony is described. The occurrence of this reverse mutation in two distinct stages indicates that mutations may have occurred successively at the corresponding loci of both chromosomes. Evidence that the reversions are due to gene mutations is discussed; the existence of multiple alleles at the locus determining colonial sculpturing is possible.

959. Kosikov, K. V.
(Changing the enzymic properties in hybrid yeasts by cultural conditions).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 195–209. [Russian].

The effect of nutrients and cultural conditions upon the inheritance of enzymic properties in various yeast hybrids, including *Saccharomyces ellipsoideus* x *S. globosus*, was studied. The experiments showed that the cells in the F_1 either lost some of the enzymic properties of one of their parental forms during the period of vegetative reproduction and sporulation, or became homozygous in respect of these properties. The evidence is thought to support Lysenko's theories on hybridization and the effect of external conditions upon hybrid organisms.

960. Kosikov, K. V.
(Directed changes induced in microorganisms by preparations extracted from related strains).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 185–94. [Russian].

Several strains of *Saccharomyces globosus* and second generation hybrids between *S. globosus* and *S. ellipsoideus*, normally incapable of fermenting sucrose, were induced to do so by introducing into the nutrient medium a filtrate of a related strain capable of sucrose fermentation. The change was inherited.

961. Wilkinson, J. F.
Adaptation to the fermentation of sugars by yeasts.
Abstr. Diss. Univ. Camb. 1949–50 (1951) : 67–68.

The adaptations of Dutch top yeast to galactose fermentation, and of *Saccharomyces mandshuricus* to maltose fermentation were investigated. In Winge's hybrids (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1652) a fast adaptation to fermentation was found to be controlled by M_1; M_3 controlled a slow adaptation.

962. Halperin, D. R. de
Selección de levaduras de panificación aisladas de levadura prensada comercial.
(Selection of bread yeasts isolated from pressed commercial yeast).
Rev. Invest. Agríc. B. Aires 1951 : 4 : 297–316.

The CO_2 producing capacity and the volume produced in a given minimum period were determined for a number of isolations from commercial yeast, using a standard dough

sample, and comparing them with type 2031 of the Lister Institute, London, and strain Delft 1 of the Dutch collection. Eleven selections gave values exceeding those for the Delft 1 strain after 3 hours at 30–32° C, the differences being highly significant. All these selections proved to be pure *Saccharomyces cerevisiae*, with no admixture of *Hansenula* or *Mycoderma*.

963. Castelli, T.
I lieviti della fermentazione vinaria nella Sicilia occidentale. (The wine fermentation yeasts in eastern Sicily).
Riv. Viticolt. Enolog. Conegliano 1950: Nos 5 and 6 : Pp. 18.

In continuation of his previous studies (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2397) the author has extended his observations in southern Italy and Sicily, where the musts were found to contain a greater proportion of species with high fermenting capacity, such as *Saccharomyces ellipsoideus*, *Kloeckera apiculata* and *Hanseniaspora Guillermondii*, than those of the more northerly zones.

964. Kilkenny, B. C. and Hinshelwood, C.
Adaptation and Mendelian segregation in the utilization of galactose by yeast.
Proc. Roy. Soc. 1951 : **139** : No. 894: 73–85.

Growth characteristics of three strains of *Saccharomyces cerevisiae* in a galactose medium are analysed. One strain requiring aneurin will not adapt to galactose; the second grows poorly at first, but eventually becomes adapted; while the third, which requires biotin and is stimulated by pantothenate, grows at an optimum rate immediately. The slow initial growth of the second strain suggests that gradual adaptation of all or most of the cells to the new medium is taking place, rather than selection of pre-existing mutants capable of utilizing galactose. Evidence is presented to show that the adaptive theory and Mendelian views of heredity are compatible. An analysis of the progeny of the four-spored asci of the third strain, Mrak 93, has shown that ability to utilize galactose segregates as though controlled by a single gene; nevertheless, the segregants which can utilize galactose exhibit, at first, varying degrees of adaptability towards this substrate.

965. Subramaniam, M. K.
Chromosomes in yeasts.
Nature, Lond. 1951 : **168** : 427–28.

A photomicrograph is given as proof of the claim made by Subramaniam and Ranganathan of having identified chromosomes and centrosomes in yeast cells.

966. Duraiswami, S. and Subramaniam, M. K.
Further evidence for mitosis in yeasts.
Experientia, Basel 1951 : **7** : p. 422.

Further evidence of mitosis in a 2-chromosome yeast strain is presented, including a photomicrograph (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1233).

967. Schulze, K. L.
Structure and division of the yeast nucleus.
Brauwissenschaft 1951 : **5** : 75–78.
[from J. Inst. Brew. 1951 : **48** : p. 380. (Abst.)].

Mitosis observed in *Zygosaccharomyces priorianus* resembles that of higher plants. It is suggested that determination of chromosome numbers is made more difficult by the tendency of chromosomes to aggregate; the commencement of budding in the region of the nucleus also distorts nuclear division.
The chromosomes of haploid cells arising from ascospores of *Z. priorianus* are smaller than those of the diploid cells and occur in threes instead of sixes.

968. Subramaniam, M. K.
A critical evaluation of the question of cytoplasmic inheritance in yeasts.
J. Indian Inst. Sci. 1950 : **32** A : 73–90.

The view is expressed that the possibility of polyploidy in yeasts has received insufficient attention among investigators. The author argues that the diploid strain reported by Winge and Laustsen as showing inbreeding depression was in fact tetraploid and that its behaviour can therefore be explained cytogenetically and not in terms of the effects of inbreeding (cf. Abst. 973). He is also of the opinion that the cytogene theory of Lindegren and plasmagene theory of Spiegelman are unnecessary explanations of non-Mendelian segregations since these can be attributed to polyploid segregation. A new mode of gene action in general is postulated. During differentiation, specific tissues become endopolyploid to varying degrees. Specific genes become effective only when duplicated above a basic number; once differentiation is complete only particular genes are active, the rest being inactive. Such a theory, it is suggested, would eliminate the necessity of postulating the existence of gene replicas in the cytoplasm to explain exponential increases in protein during growth and secretion; furthermore it would provide a new approach to the problem of the mode in which specific genes

become functional in the respective tissues during ontogeny.

969. Duraiswami, S., Mitra, K. K. and Subramaniam, M. K.
Autotetraploidy and the so-called inbreeding degeneration in yeasts.
Curr. Sci. 1951 : **20** : 235–36.

Winge, Ö.
Comments on the above note.
Ibid. 1951 : **20** : p. 236.

Duraiswami *et al.* express the view that the diploid yeast strain described by Winge and Laustsen as showing decreased vigour through inbreeding (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 711) is in fact a tetraploid and has exhibited decreased vigour as the result of a transition from a tetraploid to a diploid stage by direct germination of a diploid spore. Winge refutes this suggestion.

970. Ranganathan, B.
Studies on the mutagenic action of chemical and physical agencies on yeasts. II. Mutations induced in yeast by temperature shocks.
J. Indian Inst. Sci. 1950 : **32** A : 91–111.

A diploid brewery yeast strain was stored for 90 days at 5–10° C, the transfers from ordinary to low temperature at the beginning of the treatment and from low to ordinary temperature at the end of the storage period constituting two temperature shocks. Three types of strains were isolated: (1) an unmodified diploid; (2) autotetraploids; and (3) top yeasts regarded as being the result of chromosomal translocations. The unmodified diploid, however, exhibited a new type of sculpturing, possibly representing a gene mutation. It is suggested that doubling of the chromosome complement may be preceded by a gene mutation for polyploidy (cf. Abst. 971). Polyploidizing agents may not only accelerate the mutation rate of the locus governing polyploidy but also the mutation rate of other loci. The top yeasts of type (3) have in addition been produced by acenaphthene treatment. It is suggested that translocation is also preceded by a gene mutation, in the presence of particular allelic series.

971. Mitra, K. K. and Subramaniam, M. K.
Studies on the mutagenic action of chemical and physical agencies on yeasts. Part III. Further observations on the genetical effects of chrysene on yeasts.
J. Indian Inst. Sci. 1950 : **32** A : 113–28.

Treatment of a diploid strain with chrysene solution for different durations resulted in the induction of tetraploid sectors and colonies. The chemical exerted no influence on the direction of mutation. It is suggested that the polyploidizing effect of chemicals upon yeasts may depend upon a gene mutation for polyploidy; this mutation may then render the duplicated set of chromosomes capable of harmonious functioning. Thus c-mitosis is regarded as being essentially unrelated to the doubling of the chromosome number.

972. Subramaniam, M. K.
The problem of haploidy in yeasts.
J. Indian Inst. Sci. 1950 : **32** A : 29–40.

The general use of morphological criteria to distinguish haploid from diploid yeasts is criticized; in the author's view identification should be based upon cytological data. If polyploidy occurs in yeasts, as is thought to be highly probable, true haploids must be distinguished from polyhaploids. It is further suggested that mating types occur in tetraploids and not in diploids and are the result of a single gene mutation occurring before doubling of the diploid chromosome number; and that torulae may be sterile diploid hybrids instead of haploids.

973. Ranganathan, B. and Subramaniam, M. K.
Studies on the mutagenic action of chemical and physical agencies on yeasts. I. Induction of polyploidy by diverse agencies.
J. Indian Inst. Sci. 1950 : **32** A : 51–72.

Treatment with colchicine or camphor solution induced highly stable tetraploid colonies. Ultraviolet irradiation resulted in the occurrence of tetraploid colonies indistinguishable from those produced by these two chemicals. Giant colony characteristics were found to be valid criteria for the recognition of tetraploidy. Treatment with polyploidizing agents should be carried out on mitotically dividing cells during the aerobic phase; under anaerobic conditions tetraploid cells become endopolyploid prior to fermentation. The genetical significance of the possibility of the natural occurrence of polyploidy in yeasts is discussed and the division of yeasts into haploids and diploids by other investigators is criticized.

974. Hestrin, S.
Gene function in the homologous and heterologous induction of α-glucosidases in yeast by α-glucosides.
Nature, Lond. 1951 : **168** : p. 913.

The genes *MA*, *MG* and *SU* determine the ability to grow with attendant visible gas

production on maltose, α-methyl glucoside and sucrose, respectively (cf. *Plant Breeding Abstracts*, Vol. XXI, p. 227 and Vol. XXI, Abst. 1652). Further investigations have shown that the gene *MA* controls the capacity to give both a heterologous response (synthesis of a sucrase) and homologous response (maltase synthesis) to maltose, and that *MG* conditions the ability to give both a homologous response (production of α-methyl glucosidase) and heterologous reaction (sucrase synthesis) to α-methyl glucoside. On the basis of the hypothesis of one gene to one enzyme, it is assumed that *MA* and *MG* direct the conversion of a precursor into maltase and α-methyl glucosidase respectively.

975. Subramaniam, M. K.
Haploidy and the species concept in yeasts.
J. Indian Inst. Sci. 1950 : **32** A : 41–50.

The author puts forward the view that all yeasts are diploid or polyploid in the vegetative phase, differing only in the time at which meiosis occurs. In *Zygosaccharomyces* reduction division occurs in the vegetative cells, and the spores produced from the zygote arising from fusion of the reduced vegetative cells have the diploid chromosome number, in contrast to *Saccharomyces* in which zygote formation succeeds meiosis, the spores being haploid. It is suggested that the shift from the *Zygosaccharomyces* type of reproductive cycle to the *Saccharomyces* type and *vice versa* can be explained as the result of a single gene mutation conditioning the time of meiosis.

976. Subramaniam, M. K.
Nature and nurture in yeasts.
Proc. Indian Acad. Sci. 1951 : **34** : Sect. B : 220–25.

Evidence is presented to support the theory that variation in colonial sculpturing of *Saccharomyces cerevisiae* BY 1 on different media is the resultant expression of multiple alleles.

977. Hirschhorn, E.
Grado de estabilidad patógena de líneas monoesporidiales de *Ustilago zeae* adaptadas a desarrollar en medios que contienen arsénico. (**The degree of pathogenic stability of monosporidial lines of *U. zeae* adapted to growth on media containing arsenic**).
Ciencia e Investigación, B. Aires 1951 : **8** : 425–26.

In continuation of earlier work on the effect of arsenic on the pathogenicity of *U. Zeae* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2138), the author examined further the effect of culturing lines 17D4 and 10A4 on media containing sodium arsenate.* In the case of 17D4, 30 individuals showing no differences in cultural characters were isolated, also 30 offtypes. The normal types, however, on inoculation into maize, were seen to have lost their pathogenicity; this loss was temporary in 10 cases, but permanent in the rest. The offtypes maintained their virulence. In the case of 10A4, some offtypes appeared but pathogenicity was unaffected.

978. Batts, C. C. V.
Physiologic specialization of *Puccinia graminis* Pers. in south-east Scotland.
Trans. Brit. Mycol. Soc. 1951 : **34** : 533–38.

Inoculation experiments have established the presence of six varieties, *Tritici*, *Secalis*, *Avenae*, *Agrostidis*, *Poae* and *Phlei-pratensis* of *P. graminis;* two physiological races of *P. graminis* var. *Avenae* have also been identified. Significant varietal differences in uredospore and teleutospore measurements are recorded.

979. Miller, G. L., Eitelman, E. S. and Golder, R. H.
Evidence for mutation of southern bean mosaic virus affecting its electrophoretic properties.
Arch. Biochem. Biophys. 1951 : **34** : 162–68.

When southern bean mosaic virus was first studied at Princeton, NJ, in 1946 it had an isoelectric point of 5·5; more recent studies at Pittsburgh and Philadelphia, Pa., show a value of 5·9. It is assumed that a spontaneous mutation affecting electrophoretic properties has occurred.

980. Suhov, K. S. and Vovk, A. M.
(**The variability of tobacco mosaic virus after culture in plant organisms of different host species**).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 215–36. [Russian].

Changes in tobacco mosaic virus, including a varied degree of virulence, after being cultured in different host plants, are described. For instance, the initial strain became more virulent after its inoculation and reproduction in *Nicotiana glauca*, *N. longiflora* and *N. sylvestris*,

* ? arsenite.

and less virulent after culture in *N. lancifolia* and *N. noctiflora*.
It is concluded that heritable changes occurring in viruses after culture upon different host plants explain the origin of some at least of the races of viruses in nature.

981. Boyd, J. S. K.
Mutation in a bacterial virus.
Nature, Lond. 1951 : **168** : 994–95.
A stable lytic mutant form of phage found in *Salmonella typhimurium* is reported.

CROP PLANTS

982. Shimotomai, N.
(Artificial polyploids of *Chrysanthemum cinerariaefolium*).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : p. 30. [Japanese].
Tetraploid individuals have been obtained by treating 18-chromosome Japanese strains with colchicine.

983. Resoluciones de la IV Conferencia Interamericana de Agricultura. **(Resolutions of the Fourth Interamerican Conference on Agriculture).**
Bol. Produc. Fomento Agríc. 1951 : **3** : No. 21 : 6–27.
The resolutions included recommendations for the coordination of agricultural research, encouragement of research on pasture improvement by breeding and other methods, stimulating the production locally of selected seed and of improved varieties of agricultural plants, and the creation of a Cacao Institute in Ecuador.

984. **The work of FAO 1950/51.**
Report of the Director-General FAO, Rome 1951 : Pp. 67.
Seed distribution. Consignments of seed, chiefly of forage legumes, cereals and grasses, have been distributed to many countries for experimental use.
Wheat. It is hoped that a working party on wheat breeding in the Near East will be organized.
Maize. The fourth meeting on maize breeding was held in France, January 1951. The results of tests on American and Canadian hybrids supplied to European and other countries were discussed and further steps in the breeding programme were planned.
Rice. Progress is reported in the cooperative breeding project in Asia and the Far East. The second meeting of the rice breeders' working party was held at Bogor, Indonesia, in April 1951 (cf. Abst. 410). Work on the World Catalogue of Genetic Stocks of Rice continued (cf. Abst. 420).

985. Bell, G. D. H.
Plant breeding at Cambridge.
Agric. Merch., Lond. 1951 : **31** : 183–84, 209–10.
Breeding work on wheat, oats, barley, forage grasses, lucerne, sainfoin, red clover, potato, sugar beet, field bean and field pea in progress at the Plant Breeding Institute, Cambridge, is described.

986. McMillan, J. A.
The changing pattern of agriculture in England and Wales.
Advanc. Agron. 1951 : **3** : 165–96.
Brief reference is made to the work of the National Institute of Agricultural Botany in testing cereal, potato and vegetable varieties from 1921 to 1938. Recent developments in the production of improved crop varieties and results of subsequent trials are summarized more fully, with particular reference to improvements in early maturity and straw strength of cereals, grain quality of malting barley, leafiness and recovery capacity of herbage plants, and blight resistance of potatoes.

987. Antropov, V. I.
[The Priekuli State Breeding Station. (The result of five years' work)].
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 26–32. [Russian].
Breeding and seed growing work with various economic crops, including cereals, forage plants, potato and flax, during the last five years at the research institute is surveyed.
Wheat. The recently developed winter wheats Priekuli 481, Priekuli 1038 and Priekuli 603 have outyielded the standard Priekuljskaja [Priekuli]. Mičurinite methods are being used in breeding adapted varieties of winter wheat. A productive spring wheat, 5505–6, showing resistance to lodging has been bred.
Buckwheat. Several promising new varieties have reached the trial stage.
Oats. A new variety, 88, superior to Priekuljskiĭ Belyĭ [White Priekuli] in resistance to lodging has been developed.
Rye. Promising material has been selected and a new variety Priekuljskaja Ulučšennaja [Improved Priekuli] has been obtained.
Barley. A new variety, 1573, suitable for combine harvesting, has been developed.
Forage plants. New *Poa pratensis* varieties 129, 159 and 144 have yielded more and better quality hay than the local *Poa* variety. The

latter was also less productive than a new *P. palustris* variety, Priekuljskiĭ [Priekuli].
New productive varieties of *Festuca pratensis*, Priekuljskaja 519, 138 and 128 [Priekuli 519, 138 and 128] have been developed. All of them outyield the local variety.

Potato. Several productive early and mid-season seedlings have been selected, notably the seedlings 2069·1, 1748·2, 1457·5, 2051·9 and 2102·2, which proved resistant to wart. The varieties are still in the trial stage. Vegetative hybridization is being used at the institute in breeding the variety Vale for resistance to wart, the variety Laĭma for improvement in its keeping properties and several other varieties for resistance to *Phytophthora*. The material used for this purpose includes *Solanum demissum*, *S. Commersonii*, *S. Rybinii* and other wild species.

988.* Årsberättelse över Sveriges Utsädesförenings verksamhet år 1950. (**Annual report on the work of the Swedish Seed Association for the year 1950**). Sverig. Utsädesfören Tidskr. 1951 : **61** : 124–91.

During 1950 about 40 new varieties, élites and strains were handed over to the General Swedish Seed Company for multiplication, including the following: the winter wheat Ög 01440 (Bore I x Svenskt Sammetsvete [Swedish Velvet]), equalling Virtus in winter hardiness but superior to it in strength of straw and in grain quality; the high yielding spring wheat Ög 01140, derived from Fylgia X 0990 (Extra-Kolben I x Rubin [Ruby]), and of outstanding grain quality; the high yielding and extremely stiff-strawed, white oat 01439 (Sølv [Silver] x Örn [Eagle]), earlier than its parents and about as early as Bambu; a high yielding black oat U 01590 (Stormogul II [Great Mogul II] x Extra Klock [Extra Bell]), intended to replace Extra Klock and Engelbrekt II; a new, quite high-yielding field bean U 01 selected from a commercial small seeded variety; four strains of tetraploid red clover; and two new élites of tetraploid Stål [Steel] rye.
The work of the main institute at Svalöf is recorded below:—

Autumn wheat. Grain yields ranged between 5000 and 5500 kg. per ha. for the highest yielding varieties, e.g. for 01471 (Skandia III x 01350a) and for some relatively untested lines from Eroica x Skandia II and Eroica x Hansa.

Spring wheat. Special attention was given to crossing winter and spring forms to increase the yield of the latter. Svalöf Ella is one of these wheats. The highest yielding spring varieties, e.g. 01170b_2 (01015 x Ä 24/585), Pondus, Kärn II, Ella and two lines from the cross Diamant II [Diamond II] x 0978$_c$ gave 4200–4300 kg. per ha.

Oats. Continuing the established programme for white oat breeding, the variety Blenda was put on the market in 1950 and numerous crosses have been made using Mansholts Binder, Flämingsgold and Sølv II [Silver II] as well as crosses of lines from white-grained land oats.
Varieties of the Probsteier type are being crossed with specially early oats, to obtain early oats for the inner and higher-lying districts of southern and central Sweden.
Breeding of black oats is now done mainly in the various localities from which the different types come, as they are so highly adapted to their environment.

Rye. Svalöf and the five southern Swedish branch stations have collaborated in work on a tetraploid autumn rye, Stål [Steel].
At Ugerup, spring rye breeding was continued, with special attention to hybridization between Petkus and a land variety from Od.

Barley. Some X ray mutants were used as parents in new series of crosses.
The six-rowed Presto (Sv 01771), released in 1950, yielded 5240 kg. per ha. of grain as compared with 4710 and 5120 kg. per ha. for Brio and Asplund respectively. The naked barley Sv 01793 again showed the highest protein content per ha.

Legumes. Some lines from the pea crosses Torsdags II [Thursday II] x Munk [Monk], Ambrosia II x Sv 03101 and Torsdags II x Ambrosia II gave very good yields, surpassing the standards Torsdags II and Munk.
The fodder peas U 05661 (Solo x Hero) and U 05801 (Hero x Artturi) exceeded the best yielding commercial varieties Hero, Brio and Parvus.
The most productive vetch was Vg 0251 from Remmenedal with a seed yield of 3530 kg. per ha. Other varieties that also did well were Sv 02301 and Sv 02302, both from Tezier, and Sv 02321 from Webb's vetch.
The best field bean was U 39/19, from U 34/98; it gave 3820 kg. per ha.
Stella was the best of the brown beans, with 2685 kg. per ha.

Herbage plants. The tetraploid red clover collection did very well in the trials, especially Sv 034 (tetraploid Merkur x Wambåsa) and the

* An extended summary of this paper is on file at the Bureau.

tetraploid Merkur selection Sv 586, which is leafier and has thinner stems than Sv 034.
The tetraploid Alsike clover Sv 0205 too is noted for its superior yield as compared with diploid strains and some newer tetraploids were even better. Some tetraploids gave a remarkably good yield of seed.
To obtain high yielding lines of lucerne under Swedish climatic conditions, crossing and selection were carried out with some of the material obtained from the embryological research financed by the Wenner-Grenska Foundation.
Poa pratensis plants were X-irradiated and interspecific crosses of grasses were also begun.
Potatoes. Studies of quality, earliness and disease resistance were pursued, *Solanum demissum* being used in work on *Phytophthora* resistance.
Experiments were made on the effect of X rays and radioactive isotopes on potato tubers.
Root crops. Bolting studies of beets were continued.
Flax. The outstanding textile flaxes included, in addition to the new varieties Margareta and Kristina, a sister variety of Margareta, Sv 0222, which gave a particularly high yield of straw and seed, i.e. 35% and 5% respectively more than Herkules.
The Finnish flax Vaanila and the Danish Øtofte 59/41 equalled Renodlat [Purebred], a Svalöf variety.
Hemp. Plantings of monecious hemps are being used in breeding for adaptation to Swedish conditions.
Oil crops. Breeding of rape and soya bean was along the same lines as in 1949.
The standard Soja Vilnensis ripened on 12 September and yielded 950 kg. per ha. at Teckomatorpsgård, while Ugra ripened on 7 September and gave 1030 kg. per ha.; the corresponding yields in experiments at Ugerup were 1065 kg. and 1335 kg. per ha.
Kok saghyz. Selection is proceeding for rubber content, plant size and thickness of roots. Some of the best families, when tested at Olsgård, gave 260 kg. of rubber per ha.
Lupin. Some early X ray mutants were tested in yield trials with promising results.
Tobacco. Numerous lines from crosses of indigenous and American tobaccos were included in the yield trials and selection was carried out in some new crosses, including back crosses between the best new lines and the parent varieties.
Hops. Some of the best strains from hybrid clones have shown particularly good figures for resin content and have in addition ripened at a convenient time, with a good yield of green matter and easily plucked cones.
Cytogenetic research. Polyploids of three varieties of spring rye and of black medick have been obtained.
Tetraploid Alsike and red clover were multiplied up and polyploid timothy selections differing in chromosome number were planted at various places from Söderslätt to Abisko to test their vitality under varying geographical and edaphic conditions.
Research on tetraploid sugar beets, fodder beets and turnips continues; the turnips appear likely to be of some practical value.
The possibility of experimentally controlling mutations with a view to using the method ultimately to improve already highly bred varieties is being investigated (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 871).
Institute for Genetic Research. The information given on the work of this Institute differs little from that provided in the 1949 report.
Appended to the above record of work at Svalöf are detailed reports from the various branch stations and the Legume Division, whose work was carried out at the Ultuna Station.

989. Åkerman, Å.
The Swedish Seed Association Organization, methods and results in plant breeding.
NIAB, Cambridge 1951 : Pp. 15.
Cereal, herbage plant, flax, hemp and oil crop breeding in Sweden is surveyed.

990. Dorst, J. C.
Neue Wege auf dem Gebiete der Pflanzenzüchtung, besonders in Holland. (**New methods in the field of plant breeding, particularly in Holland**).
Schweiz. landw. Mh. 1951 : **29** : 411–27.
It is pointed out that plant breeding is becoming less intuitive and more scientific, that both the methods and the material used are becoming more extensive, and more attention is being given to resistance as well as yield. Examples quoted include tetraploid rye, which is being tested on a field scale, and is now equal to diploid rye in fertility and somewhat better in yield; the use of heterosis to combine the high yields of American hybrid corn with the climatic adaptability of Dutch maize varieties; the selection of a large range of wheat-like segregates from amphidiploid *Triticale*, some of which are being used as parents in wheat breeding; and backcross hybrids from crosses with *Solanum demissum* which are resistant to

the main biotypes of *Phytophthora infestans*, and are to serve as material for further breeding work, for instance in efforts to produce disease-resistant forms of the variety Bintje; in this programme three generations of potatoes a year are raised. Intensive studies are being made on bud sports in potatoes, partly to ascertain if any of them are superior to the original variety.
A brief description is given of the working of the Breeders' Decree for the protection of the financial rights of plant breeders, and of the way official breeding institutes and private breeders are cooperating in Holland.

991. HÄNSEL, H.
Das Institut für Pflanzenzüchtung in Wageningen (Holland). [**The plant breeding institute at Wageningen (Holland)**].
Bodenkultur, Wien 1951 : **5** : 387–90.

A general account is given of the organization of the Wageningen institute and of its activities. Special mention is made of measures employed to accelerate potato breeding, such as grafting on tomato and various treatments to promote rapid tuber formation; and of the use of vegetative reproduction for clone breeding in rye.

992. **Annual Report of the Agricultural Department, Orissa, for 1947-48** (1951) : Pp. 162.

Sorghum. Single plant selection was effected.
Rice. Work on the production of improved selections from varieties and hybrids at Berhampur and Jeypore is reported.
Jute. In extensive trials, D 154 and GO were superior in yield to KB and Local Red. New strains developed at the Jute Agricultural Research Laboratories, Dacca, were also tested. C 42NJ–412 gave the highest yield.
Turmeric. Local and introduced types are under trial.
Citrus fruits. Work at the Angul Station comprises (1) collection of varieties from different parts of India for selection, and (2) production of uniform seedlings of rootstock varieties.
Coconut. Trees were selected in the Puri district to provide seed nuts, with a view to producing superior seedlings for distribution.
Pulses. Improvement of mung (*Phaseolus radiatus*), biri (*Ph. Mungo*) and kulthi (*Dolichos biflorus*) continued.

993. **Administration Reports of Subordinate Officers of the Department of Agriculture, Madras, for 1948-49** (1951) : Pp. 455.

In addition to the work summarized below, varietal trials with the following crops are reported: wheat, millets, sorghum, rice, cotton, jute, sugar cane, cardamom, *Ricinus communis*, *Sesamum indicum*, linseed, oil palm, citrus fruits, guava, mango, groundnut, coconut, gourds, cucumber, *Phaseolus Mungo*, *Ph. aureus*, *Dolichos* spp., cowpea, *Cicer arietinum* and *Cajanus Cajan*.
Maize. At the Coimbatore Millet Breeding Station crosses were carried out between many inbred selections to produce hybrids suitable for fodder.
Pennisetum typhoides. Selection and hybridization of cumbu for improved grain yield and quality are in progress. Two hybrids X 350 x X 348 and X 411 x X 422 have outyielded their female parents and equalled their male parents in grain yield. Numerous promising single and double crosses have been effected in the programme utilizing hybrid vigour to increase yields.
Repetition of a cross pollination experiment carried out at Coimbatore has indicated that simultaneous flowering of male and female parents and maximum hybrid seed set occur when both parents are sown on the same day; this result contrasts with that of the previous investigation (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2668).
An interspecific hybrid between *P. typhoides* and *P. purpureum* shows a high degree of rust resistance; the F_1 is being back-crossed to cumbu. An amphidiploid form of the hybrid has been obtained.
Eleusine coracana. Crosses to increase the straw yield of Co. 2, a variety with a high grain-yielding capacity, have been undertaken.
Setaria italica. Many promising tenai selections have been made from progeny of crosses effected to combine early maturity and high yielding ability; SI 4919 is outstanding in this respect. Three selections, SI 3756, SI 4054 and SI 3779, show some degree of resistance to *Uromyces*.
Other millets. Selections with improved yielding ability have been made from *Echinochloa frumentacea*, *Panicum miliare*, *P. miliaceum* and *Paspalum scrobiculatum*.
Sorghum vulgare. Attempts to improve yielding capacity and quality of grain types have included the following crosses: Thalavirichan x large-grained forms of *S. conspicuum* from Africa; Co. 9 x Co. 7, to incorporate the white grains of the latter in the widely grown variety Co. 9; and Irungu x Perimanjal and Irungu x Vellai, to improve both grain size and yield of Irungu.

A high degree of resistance to *Striga lutea* and *S. densiflora* has been incorporated in progeny of two Perimanjal strains, Co. 1 and AS 60, and Patcha Jonna N 1 and T 6 by hybridization with AS 4003 from Africa and AS 4693 from Bombay (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2668).

Breeding for improved fodder strains has involved crossing Perimanjal Co. 1, Thalavirichan, Irungu and irrigated varieties such as Vellai, Chinnamanjal and Sen with a few local types having sweet juicy stalks; the juiciness of Kaki Jonna has been increased by hybridization with American sweet sorghum varieties. Data are presented on comparative analyses of HCN content in varieties used for fodder; only one commonly grown variety had a nonlethal concentration at all stages of growth.

The late maturing Co. 4, with a high degree of blast resistance, has been crossed with susceptible early, mid-season and late maturing varieties of good quality. Crosses have been effected between cultivated and wild rices to combine the drought and flood resistance of the latter with the desirable agronomic characteristics of the former; MTU 16 proved moderately tolerant of submersion. Numerous selections have been made from the progeny of various crosses for improved tolerance of saline conditions.

Oryza sativa var. *fatua* and additional species such as *O. coarctata*, *O. australiensis* and *O. longistaminata* have been contributed to the living collection maintained at Coimbatore. Colchicine, X ray and thorium treatments have been used in an attempt to produce fertile F_1 progeny between species whose interspecific hybrids are sterile.

Sweet potato. Intervarietal hybridization is reported.

Cotton. Heterosis was observed with respect to plant height, seed yield and lint length in *Gossypium arboreum* x *G. herbaceum* hybrids. A staple length of 34 mm. was produced by two selections, 2007–1/9 and 56 B–120A, from *G. Darwinii* x *G. hirsutum* var. *punctatum*. Pollen from a hexaploid form of *G. Raimondii* induced parthenocarpy in 7% of the progeny produced by pollinating *G. arboreum* and the F_1 of *G. arboreum* x *G. herbaceum;* the development of parthenocarpic offspring possessing desirable morphological characteristics will dispense with the process of varietal purification over several generations. A cleistogamous mutant was discovered in the interspecific hybrid progeny of Co. 2 (*G. hirsutum*) x Maarad (*G. barbadense*); the inheritance of this character is being investigated in 36 crosses with commercially acceptable varieties. Cleistogamy should facilitate the maintenance of pure lines.

A study of the inheritance of three new genotypes in *G. arboreum* race *indicum* (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1982) was completed.

Many improved strains of American, Sea Island, Karunganni, Nadam, Cocanada, Mungari, Northern and Western cottons from recent crosses have been selected for their adaptability to particular regions.

Ricinus communis. Nine new crosses have been effected between established varieties and early maturing strains. Several selections with early maturity, prolific growth habit and long compact fruit clusters were made from F_3 and F_4 progenies of earlier crosses. Co. 1 is recommended as a perennial variety.

Sesamum indicum. F_1 progeny of recent crosses have been studied in respect of seed colour, oil content, number of flowers in each axil and compactness of capsules; 20 additional crosses were made between selected plants in an attempt to develop a white-seeded strain.

Groundnut. Hybridization is in progress to develop a dormant bunch type and a white-seeded variety; 18 new crosses were made between selected parents, and F_2 and F_3 progenies of earlier crosses were grown.

Coconut. Progenies of intervarietal and intravarietal crosses have been studied in detail. Yield data indicate that it is inadvisable to use trees with past annual records of less than 40 nuts as parents. Tall x dwarf hybrids are early and prolific bearers; an analysis of copra quality indicates that the percentage of oil is intermediate between that of the parents.

Hibiscus esculentus. Selected pure lines have been crossed to develop high yielding hybrids. A hybrid seed set of 65% was achieved by hand-pollinating in the early morning.

994. **Annual Report of the Department of Agriculture, Tanganyika 1949** (1951): Pp. 141.

Selection of the following is reported: maize; sorghum; *Setaria*, *Panicum* and *Eleusine* millets; rice; legumes; coffee; and sunflower. Agave hybrids are under trial (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1201). Cotton selection and breeding continued (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2422). Several clones of cassava from Amani exhibited a high degree of mosaic resistance at Ukiriguru.

995. Romyn, A. E.
Division of Agriculture and Lands. Extracts from the Annual Report of the Secretary, Division of Agriculture and Lands, for the year ended 30th September, 1950.
Rhod. Agric. J. 1951 : 48 : 344–64.

Maize. Hybrid maize again gave a yield increase of approximately 25% over open-pollinated varieties.

Sorghum and millets. Sorghum varieties and selections, comprising dwarf and tall varieties, are being tested at the Matopos Station. The varieties have been introduced from many countries. Work is also being carried out on the production of dwarf millets for combine harvesting and tall millets for silage. The millets appear to be better adapted to the poor granite said-veld areas than any other grain crop.

Grasses and legumes. Stoloniferous strains of Napier grass suitable for grazing are being bulked.

A large number of grasses and clovers are being subjected to preliminary selection.

996. **Report of the United Kingdom Agricultural Mission to Canada 26th June–25th August, 1950** : Pp. 117. (Mimeographed).

An account of the tour made of many Canadian agricultural institutions includes a section on visits to centres of breeding and selection, where improved varieties of cereals, forage grasses, forage legumes, fodder beet, potatoes and tobacco are being developed.

997. **Report of the Minister of Agriculture for Canada for the year ended March 31, 1951** : Pp. 102.

Wheat. In spring wheat breeding, work is being concentrated upon producing varieties resistant to stem rust race 15B and races of leaf rust. The resistance of McMurachy to race 15B has been introduced into several promising lines of common wheat.

At Ottawa, the development of disease resistant, hardy soft winter wheats, suitable for the pastry trade, is in progress. In breeding hard red winter wheats at Lethbridge, improved hardiness and bunt resistance are the chief aims; improvement of soft white winter wheats for irrigated land is also under way.

The chromosomes concerned with the inheritance of solid stems and sawfly resistance were identified. A wheat with better quality than the sawfly resistant variety Rescue is being sought for the Prairie provinces.

Quality tests of new varieties and hybrids were carried out (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2550). Some of the sawfly resistant varieties were superior to Rescue.

Work continued on the role of the antibiotic bacterial flora of the seed in the apparent resistance of varieties to root rot (*Helminthosporium sativum*). Varietal differencee in catalase content may indicate the degree of natural resistance or susceptibility to root rot.

Data from pairings of monoascosporic cultures of *H. sativum* revealed that the fungus is hermaphroditic, self sterile, intragroup sterile and intergroup fertile.

Oats. At Ottawa and Winnipeg breeding is mainly concerned with the development of varieties combining stem and crown rust resistance with early maturity and other heritable characters. At Scott, Sask., drought resistance is receiving attention.

With the occurrence of race 7 of stem rust, varieties such as Clinton, whose stem rust resistance was derived from White Tartar, are no longer resistant. Some derivatives of Garry show resistance to Victoria blight and all known races of stem rust in Canada.

Other projects include: resistance to redleaf disease, the causal organism of which has not yet been identified; resistance to *Septoria* leaf blotch; varietal differences in rate of growth of the panicle primordia in relation to maturity and sowing date; varietal differences in frost resistance at different stages of maturity; inheritance of reaction to diseases; and chemical composition of varieties grown under different environmental conditions.

The new variety Lanark, recommended for eastern Ontario only, was licensed (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2587).

Barley. Several programmes of breeding for resistance to diseases and other characters are being carried out. Stem diameter, plant height and root anchorage have been found to be factors affecting lodging. Progress has been made in the search for varieties with resistance or tolerance to common root rot. Analysis of loose smut races is providing useful information for breeding.

Forage grasses. Improved varieties, developed by the Division of Forage Plants, Ottawa, have given the following increases in yield on a dry matter basis compared with commercial seed: Chieftain Canada blue grass, 11%; Ensign meadow fescue, 13%; Climax timothy, 16%; Parkland bromegrass, 26%; and Delta Kentucky blue grass, 50%.

Lucerne. Several selections and progenies from crosses exhibited a high degree of resistance to bacterial wilt.

Clovers. A variety resistant to *Sclerotinia* crown rot is being bred from the red clover Ottawa.

Colchicine-induced tetraploids of red and Alsike clover show marked increases in vigour and disease resistance, and thus in yield. It is hoped that their seed fertility can be improved by selection.

In breeding a sweet clover variety with little or no coumarin, valuable material has been derived from crosses of agronomically desirable strains and varieties with hybrids involving a coumarin-free yellow-flowered species; the latter hybrids were obtained from the University of Wisconsin.

Field bean. Progress has been made in breeding for resistance to blight and anthracnose.

Potato. The late blight resistant varieties Canso and Keswick were introduced (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1152).

Out of 395 seedlings tested only one exhibited some resistance to leaf roll. Bacterial ring rot resistance was found in 7 out of the 61 seedlings tested. Fifty new seedlings survived the extreme conditions of late blight infection in the blight chamber. After repeated trials, 30 seedlings were found to be highly resistant to common scab. Wild species of *Solanum* showing resistance to Colorado beetle may be used in breeding.

Fibre flax. Lines of Stormont Cirrus have been developed which have proved to be highly resistant to wilt.

In trials at several centres, Stormont Gossamer L 26 and Liral Prince led in fibre production.

Tobacco. The flue-cured variety Delcrest (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1747 and Vol. XIX, Abst. 1479) has been found to have wide adaptation in other parts of the world, as well as in southwestern Ontario. In tests at Delhi, Ont., it continued to be outstandingly superior to other flue-cured varieties. The burley tobacco Briarvet, involving Harrow Velvet in its parentage, was released. It is resistant to black root rot and also shows a fairly high degree of resistance to brown root rot.

Th. basicola occurred naturally in two distinct forms, the brown and grey wild types. All grey types exhibited less pathogenicity than the brown. The latter type consisted of at least two physiological races, I and II. Cultures of II proved less pathogenic than those of I. All cultural mutants exhibited less pathogenicity than those of I. All cultural mutants showed less pathogenicity than the wild types.

Annual oilseed rape. Colchicine-induced tetraploids show increased yield and seed size, good fertility and an oil composition similar to that of the diploids (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2922). The tetraploids do not cross readily with the parental varieties.

Linseed. The stem rust resistant variety Rocket is increasing in popularity among growers (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1479). Redwood, developed in Minnesota, has been recommended for licensing (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1195).

Fruits. The new apple Bancroft is being planted for extensive trial in Ontario and Quebec. The possible value of polyploids and X-ray-induced mutations of apple is being explored. Spartan, a new apple developed at Summerland, BC, has exhibited outstanding hardiness (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1270). At Ottawa the ornamental crab Geneva is to be used as a source of scab resistance.

Breeding for fire blight resistance in pears is being carried out at Summerland.

Raspberry breeding for cane blight resistance is under way at Ottawa.

In work on the production of virus free stocks of strawberry, a native strain of *Fragaria vesca* is giving good results as an indicator.

Cabbage. The new variety Canadian Acre, now in commerical seed production in British Columbia, is medium small, compact, early maturing and uniform in heading.

Tomato. The new early maturing variety Carleton (Abel x Marglobe) is suitable for market and domestic gardens. The new F_1 hybrid varieties, Monarch (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1686) and Mustang, have produced heavy early yields of fruits with good quality. L–3700 Sel. III will shortly be named; the variety is early maturing, even in the short growing season of the Lethbridge area, and is promising for canning.

998. **Investigations 1949-1950.**
Bull. Dep. Agric. Jamaica 1951 : No. 47; Pp. 127.

In addition to work summarized below, varietal trials were carried out on maize, sorghum, rice, forage grasses and legumes, potato, sweet potato, jute and other fibre crops, sugar cane, cassava, yam, cacao, various oil seeds, mango, groundnut, banana, grape, musk melon, cucumber, tomato, kidney bean and soya bean.

Coffee. High yielding individuals for use as mother trees are being selected (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 154).

Cashew. Selection is continuing at the Irwin Agricultural Station (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 154).

999. **Administration Report of the Director of Agriculture, Trinidad and Tobago, for the year 1949 :** Pp. 31.

Adaptability trials of varieties and strains of the following crops are reported: rice, sugar cane, citrus fruits, coconut and tomato.

Cacao. Hybridization is in progress between high yielding ICS clones and introductions from South America with resistance to *Marasmius perniciosus;* seedling progenies are under observation.

1000. **Annual Report of the Department of Science and Agriculture, Barbados, for the year 1948-1949 :** Pp. 99.

Varietal trials of maize, sorghum, velvet bean, groundnut, onion, tomato, cowpea and soya bean are reported, with data on numerous selections of cotton and sugar cane, and details of 107 *Saccharum* crosses made during the season.

1001. **Annual Report of the Department of Science and Agriculture, Barbados, for the year 1949-1950 :** Pp. 74.

Cotton. Varietal trials were carried out at Codrington and many selections were made. An average lint length of 60 mm. is being maintained.

Sugar cane. At Groves Agricultural Station numerous crosses were effected and seedlings obtained. Trials and subsequent selection of seedlings of various ages have continued. Two promising third year seedlings, B 46223 and B 46397, are morphologically indistinguishable from B 41211, which is an outstanding variety (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2864); cytological investigations are in progress to determine whether all three clones are identical. Several more third year seedlings compared well with locally grown canes but none of the B 44′ or B 45′ series showed sufficient improvement over standard varieties to be recommended commercially.

Varietal resistance to cane borer (*Diatraea saccharalis*) is being investigated.

1002. **Report of the Governing Body and the Principal's Report of the Imperial College of Tropical Agriculture, St. Augustine, Trinidad for 1949-50** (1951) : Pp. 99.

Sugar cane. Differences in the relative proportions of 12 aminoacids and total aminoacid content have been found in commercial varieties.

Cacao. Controlled pollinations have been made among local *Theobroma* strains from various geographical areas, within Central American material, between M 8, ICS 1 and ICS 45, representing Amazonian Forastero, Trinitario and Criollo groups respectively, and between different groups of ICS and SCA clones.

Statistical analyses of reaction to witches' broom (*Marasmius perniciosus*) have shown that ICS 95 has significantly fewer infected pods than any other clone. Hybrids between ICS 1 and resistant South American clones are undergoing resistance trials.

Investigations on the mechanism of self sterility have been continued.

Banana. The search for diploid male parents to replace Pisang Lilan in crosses with Gros Michel has continued. A new selection known as 1071 (10), developed from a seeded diploid with long fingers crossed with Pisang Lilan, grows strongly, produces a symmetrical bunch and has a pleasant flavour. Tetraploid seedlings from Gros Michel x 1071 (10) are already growing vigorously. Tongat, another edible diploid, has been used in place of Pisang Lilan for breeding new male parents; Paka, a recent introduction from Zanzibar via Kew, may also prove valuable for this purpose.

Research on variation in female fertility of Gros Michel is in progress.

Cytological and genetical analyses of *Musa acuminata* continue with particular reference to chromosomal interchange and parthenocarpy. Some new interspecific hybrids have suggested evolutionary relationships between the sections *Eumusa* and *Rhodochlamys*. There are indications that the importance of *M. Balbisiana* in the origin of edible bananas has been overrated.

1003. Stoa, T. E.
Seed distribution in 1951.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1951 : **13** : 237–40.

The following varieties have been released in North Dakota: the wheats Lee (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 979) and Nugget (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1693); the oat Shelby (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 32); and the linseeds Redwood (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1195) and Marine. Marine, selected from a cross between CI 975 and Sheyenne, shows tolerance of pasmo, immunity from North

American races of rust and resistance to wilt. It is slightly earlier than Dakota. In oil yield it has exceeded Sheyenne, Dakota and Redwing; its oil is of excellent quality. Marine is expected to replace the rust susceptible Dakota to some extent, and to supplement Sheyenne, where an early ripening variety is required.

1004. **Research on Maine farm problems. Sixty-Seventh Annual Report of Progress year ending June 30, 1951.**
Bull. Me. Agric. Exp. Sta. **1951** : No. 491 : Pp. 80.

Varietal trials are reported on the following: wheat, barley, oats, forage grasses and legumes, cherry, raspberry, broccoli, cucumber, tomato, peas and sweet corn.

Potato. Progress has been made in the development of seedlings with resistance to late blight and ring rot; further tests for tuber quality are being carried out. Many seedlings produced at Highmoor Farm from crosses between leaf roll resistant parents showed a high degree of leaf roll resistance; several selections were made, with yields comparing favourably with the standards Chippewa and Katahdin.
Methods of spindle tuber control by selection are outlined (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2810).
Green Mountain and Idaho proved superior to Kennebec and Katahdin in baking quality. Differences in fat absorption capacity, affecting the quality of crisps and chips, were observed between several varieties; Kennebec is preferable for making both crisps and chips.

Apple. Adaptability trials of varieties from other stations are in progress. Promising early maturing selections have been made from locally developed seedlings fruiting for the first time.

Blueberry. Ten native high-bush selections made with respect to berry size, colour and flavour are being tested for hardiness.

Strawberry. Three new winter hardy varieties, Monmouth, Orland and Maine 55, have been developed. All three are vigorous and highly productive and produce berries of good size, appearance and quality.

Melon. Early maturing selections have been made from Thousand Dollar, but they vary considerably in respect of quality.

Beans. Halo blight resistant snap beans have been obtained from selected pure lines. Some early maturing selections of Yellow Eye dry bean have shown improved anthracnose resistance.
Results of adaptability trials with snap bean varieties are reported. Tenderpod, Logan, Supergreen, Fullgreen and Full Measure proved very suitable for quick freezing.

1005. **Research and farming. Seventy-second Annual Report of the North Carolina Agricultural Experiment Station 1949.**
1950 : **8** : Progr. Rep. No. 4 : Pp. 68.

Oats. Breeding is in progress to combine resistance to *Helminthosporium* blight and rust in a single variety.

Maize. Several new hybrids have shown promise in trials. Three white hybrids known as NC 8104, 8105 and 8106 resist lodging better than the standard Dixie 17. NC 8106 is a one-eared type producing large ears; it possesses a high degree of resistance to *Physoderma Zeae-Maydis*. Two yellow hybrids, NC 8037 and 8047, are well suited to the northern mountainous areas where they mature earlier than native strains.
Inbreds with resistance to *Helminthosporium carbonum* have been tested for yielding capacity, lodging resistance and grain quality; it is hoped that one with desirable characteristics will be found to replace NC 37, the susceptible inbred parent of Dixie 17.

Barley. Colonial (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1022) has outyielded all other winter barleys. While Colonial is not resistant to rust it is considerably tolerant.

Maize for silage. NC 27, US 282, Dixie 17 and Dixie 18, developed as grain varieties, have produced high yields of good quality silage in recent trials; US 282 is particularly suitable as an ensilage variety in mountainous regions.

Forage legumes. Variation in degree of resistance to *Rhizoctonia Solani* and *Fusarium oxysporum* var. *Medicaginis* has been found in strains of lucerne. Breeding work has been initiated to develop a plant resistant to both pathogens and consequently able to survive longer than many commercial varieties.
It is hoped that recent improvements in the technique of controlled pollination will increase the number of new lespedezas.

Potato. Late blight resistant varieties are being tested for adaptability to conditions in North Carolina; both White Cloud and La Salle have given high yields although they are not resistant.

Sweet potato. Ascorbic acid and carotene contents of Oklahoma–24 are consistently greater than those of Porto Rico.

Cotton. Several hybrids have given higher yields than many inbred lines formerly thought to be outstanding. Large scale production of hybrid seed is, however, restricted by the difficulty of effecting controlled cross pollination. A new triple hybrid from a cross between Coker 100 Wilt and a synthetic hybrid derived from an Asiatic species and an American species native to Arizona has a fibre strength some 50% above that of Coker 100 Wilt. This new hybrid is being back-crossed repeatedly to standard American varieties to increase yields without reducing fibre strength.

Tobacco. Reference is made to the release of Dixie Bright 27, 101 and 102 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2514). Bottom Special has outyielded all other varieties commonly grown throughout the state and is recommended for certification. A high yield was also given by 402 whose quality is superior to that of Bottom Special.

Groundnut. New late-maturing selections from high yielding hybrids have a much improved degree of resistance to leaf spot (*Cercospora personata*) and consequently outyield many commercially grown varieties.

Mutant forms with leaf spot resistance are being sought among plants grown from seed exposed to X rays of up to 80,000 r.

Rubus. The release of 40–7–6, a vigorous raspberry from the F_2 of a cross between the trailing *Rubus parvifolium* and an American cultivated raspberry, is reported. Size, shape and quality of the fruit resemble Latham. The new variety is well adapted to eastern North Carolina where it retains its foliage well throughout the summer, resists common diseases and gives high yields.

A dewberry selection known as 38–7–3 has been made from Austin Thornless x Lucretia. It is more vigorous and disease resistant than Lucretia, the variety now widely grown. The fruit resembles Lucretia in size but is somewhat firmer and ripens a few days earlier.

Blueberry. Two new varieties, Murphy and Wolcott, have been released (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2134).

Grapes. Two new perfect-flowered varieties, Burgaw and Wallace (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2493), are recommended as pollinators for dark and white muscadines respectively. Both varieties produce high yields themselves after self pollination and are therefore preferred in place of male vines. Breeding is in progress to develop perfect-flowered types having yield and quality to compare with pistillate varieties such as Scuppernong, Hunt and Thomas.

Shallot. Several strains imported from Louisiana have been tested during the past three years; they have proved sufficiently winter hardy and disease resistant for recommendation to local growers.

Tomato. In trials on soil infested with *Fusarium Lycopersici*, Panamerica and Southland (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 578) significantly outyielded Marglobe, Rutgers and Pritchard.

Soya bean. Hybridization is in progress in an attempt to combine all the desirable characters from existing varieties into one variety. Plants with good combinations of yielding capacity, oil content and resistance to lodging, shattering and common diseases have already been selected.

1006. **Thirtieth Annual Report of the Georgia Coastal Plain Experiment Station 1949-1950.**
Bull. Univ. Ga 1950 : No. 49 : Pp. 151.

Maize. A study of hybrids has shown that increased husk coverage is important in reducing attack by both earworm and weevil. Attention is also being given to breeding for resistance to *Helminthosporium* spp., *Physoderma Zeae-Maydis*, root rots and nematodes. Other breeding problems being studied include zinc deficiencies among different hybrids and the use of cytoplasmically inherited male sterility in producing hybrid seed without detasseling.

Grasses. An F_1 hybrid form of the Bahia grass Pensacola has been produced which is leafier than the ordinary variety Pensacola (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1669) and gives 25% higher yield. An apomictic hybrid between Pensacola and common Bahia grass has shown promise in preliminary tests.

Work on the production of an F_1 hybrid of cattail millet is being carried out. The synthetic variety, Starr, has been released (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1898).

Crossing between the prostrate, anthracnose resistant Dallis grass introduced from Uruguay and other selections has failed because of apomixis in the former.

Progress has been made in developing a Sudan grass combining the desirable characteristics of common, Texas Sweet and Tift Sudan. Tift Sudan continued to exhibit superior disease resistance; it may be expected to produce more forage and contain a higher percentage of digestible nutrients than other varieties grown in the humid southeastern states.

For turf purposes, the Bermuda grass hybrid

Tifton 57 has shown superiority over common Bermuda.

Sweet potato. In general, Japanese and Pacific Island selections have proved inferior to American varieties. Several possess disease resistance, however, and may be valuable in breeding.

Breeding has as its chief objective the development of a table variety, with good yield, high carotene content, attractiveness for the consumer and resistance to stem rot and other diseases. Resistance to stem rot is inherited. The most resistant selection so far discovered is Tinian PI 153655.

In the work on the technique of hybridization, it has been found that the most effective time for emasculation is late afternoon, and for pollination from 7 to 9 a.m. the following day.

Cotton. In breeding upland cotton, improvement of the highly wilt resistant variety Pandora is being continued. A line from a cross between Station C and a selection of Empire possesses both early maturity and high yielding ability; this line is to be released as Early Fluff provided that it maintains its promise. A study of seasonal variations affecting natural crossing has been made, in connexion with the use of hybrid vigour.

Breeding Sea Island cotton during recent years has been chiefly concerned with hybridization of varieties of this type with American and foreign Egyptian varieties. One hybrid selection is particularly valuable with regard to its yielding ability, boll size, fibre properties and lint percentage; in addition it has given good results in a preliminary spinning test. Further improvement is to be effected by selection and by hybridization with stronger-fibred varieties.

Tobacco. Improvement at the Shade Tobacco Experiment Station aims at developing a tobacco combining good quality and resistance to root knot and blackshank; at present no selection shows promise of superiority over the standard Rg.

Tung. It is hoped that work now in progress will result in varieties with satisfactory yield and resistance to cold in late spring, so that the crop will have greater commercial possibilities.

Pecan. The results of a variety test during the period 1924 to 1949 are tabulated. Varieties exhibiting scab resistance comprise Farley, Bradley, Stuart, Curtis and Desirable.

Groundnut. Strains 146 and 205, of the Spanish type, have outyielded Small Spanish. Both these strains produce nuts a little larger than those of Spanish and have a slightly lower shelling percentage. Seed of strain 146 is being increased.

Blueberry. Interspecific hybrid seedlings are under observation. Plants from Northern Highbush x Florida Evergreen show some promise. The varieties Callaway and Coastal (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1909) have been bred from crosses between the rabbiteye blueberries Myers and Black Giant.

Grapes. The results of a trial of muscadine varieties during the period 1924 to 1948 are summarized.

Vegetables. Varietal trials are reported.

1007. **Annual Report of the University of Florida Agricultural Experiment Stations for the fiscal year ending June 30, 1950** : Pp. 263.

Oats. Southland (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 263) has given high yields of grain and forage throughout the state; forage yields from CI 52–8 and Camellia have been good but grain yields were only moderate. At Gainesville further hybridization and selection have been carried out for disease resistance combined with high yielding capacity. Breeding work at the North Florida station is in progress to incorporate in Southland the rust resistance possessed by Santa Fe, Trispernia and Landhafer and to develop new varieties resistant to race 7 of *Puccinia graminis* and tolerant of glume blotch (*Septoria nodorum*).

Rye. Hybridization is under way to improve the leaf and stem rust resistance of Florida Black; this variety outyields all others in respect of grain and forage.

Maize. Breeding work with hybrids continues for improved yield and quality; resistance to army worm is being sought. Dixie 18 gives high yields and is moderately resistant to weevil, but Florida W–1 shows a higher degree of weevil tolerance when infestation is severe.

Sorghum. Several varieties suitable for combine harvesting are being tested. Norghum (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1656) is well adapted to local conditions. Hegari, Early Hegari and Sagrain continue to give good grain yields at Gainesville. Belleza, a grain type introduced from Puerto Rico, has produced heavier heads than Sagrain at Everglades.

Forage grasses. Argentine Bahia has again outyielded four other strains although its seed heads are more susceptible to ergot (*Claviceps purpurea*) than the others. Among numerous introductions undergoing adaptability trials, an

unidentified *Paspalum* and three strains of *Panicum maximum* have proved outstanding; five promising strains of *Chloris Gayana* were selected.

Forage legumes. Various strains of clover, vetch and lupin are being tested for adaptability and resistance to cold and diseases. Analyses of percentage pollination and seed set in four varieties of clover are being made with respect to honey bee populations. Two vigorous strains of *Vicia angustifolia* have been selected from trial plots. A strain of *Melilotus* from Gainsville, the fine-stemmed Nebraska N–1 (FC 23636) and Emerald (FC 23385) were outstanding among 18 strains subjected to heavy grazing; all three produced good seed crops later in the season. On ungrazed areas the same varieties of sweet clover gave highest yields. Several promising lines of both sweet and bitter strains of blue and yellow lupins were selected for further trials in respect of plant form, disease reactions and seed yields.

Potato. The results of yield trials are reported. Further observations have been made on the effect of ethylene chlorohydrin on dormancy (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 890); some varieties have given increased yields after treatment.

Sweet Potato. Trials are in progress prior to selection.

Fibres. Two Sea Island cotton strains, EH 808 and Sealand 542, outyielded others at trials in three counties.

Several Javanese varieties of ramie have shown adaptability to conditions in Florida. A Brazilian variety and PI 87521 proved superior in respect of fibre yield.

Trials of *Sansevieria* are in progress.

Sugar cane. F 31–762, CP 29–116 and Co. 290 continue to surpass new varieties in respect of ratooning capacity and brix readings. Numerous selections have been made at the Everglades Station from the F 46 and F 47 series. Seedlings from the cross F 31–962 x *Saccharum robustum* and from F 36–918 pollinated by 15 other varieties are on trial.

Tobacco. Progenies of recent crosses between root knot resistant selections and broad-leaved flue-cured varieties contained several resistant lines with good curing qualities; leaf size was, however, too small.

Less than 1% of the selections from crosses involving Rg were susceptible to black shank (*Phytophthora parasitica* var. *Nicotianae*).

Oil seeds. Carolina 4524 is more vigorous than other *Sesamum* introductions. A nonshattering selection from South Carolina has been crossed with early maturing local strains.

Two linseed varieties, Victoria and CI 980 x Redson, have shown a high degree of disease resistance.

Comparative winter hardiness of 18 *Aleurites montana* seedlings is being investigated. F_2 hybrids from reciprocal crosses between *A. montana* and *A. Fordii* have flowered for the first time.

Selections have been made from sunflower hybrids in an attempt to obtain strains which grow to normal height during the winter and give heavy seed yields.

Groundnut. Improvement by hybridization is being continued. A sister line of Dixie Runner, known as Florida 230–118, also gives high yields of sound seed.

Soft fruits. Seedlings of *Rubus albescens*, a raspberry native to India, appear to be well suited to Dade county. Hybridization is in progress to incorporate the vigour and disease resistance of this introduction into commercially grown raspberries.

Varieties of blackberry and blueberry from other states are undergoing adaptability trials. Several hybrid strawberries developed in 1948 have recently outyielded Missionary and produced large fruit of good quality. Five selections with a high degree of resistance to leaf spot (*Mycosphaerella Fragariae*) have been made from offspring of crosses between Missionary, Klonmore and Bellmar.

Grape. Progeny of Pixiola x Golden Muscat have shown resistance to root degeneration; the vines are vigorous and produce fruit of good quality.

Cauliflower. Snowball Y, A and 16 and two strains of Super Snowball have proved superior to nine other varieties in recent trials.

Broccoli. A new strain, Texas 107, from Texas Agricultural Experiment Station has outyielded 17 other varieties by 30% (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 3075).

Lettuce. Imperial 44 and Great Lakes have produced good yields of marketable heads in a recent varietal trial.

Celery. Numerous crosses made among plants of the Pascal type have combined resistance to early blight (*Cercospora Apii*) with commercially desirable growth habit and flavour.

Cantaloupe. All varieties except self-pollinated lines of Smith's Perfect were severely damaged by downy mildew at one location; elsewhere, resistance comparable with that of Smith's Perfect was seen in Weslaco B, C and

H from Texas and Georgia 47. Fruits of all four new varieties are of good quality but smaller than the size preferred by local growers; further selection is in progress.
Crosses were made between Smith's Perfect and Imperial 5 in order to combine resistance to both downy and powdery mildews with early maturity, small fruit size and even-netted appearance.

Water melon. Progress has been made in the development of a strain of Cannon Ball with resistance to *Fusarium* wilt. Line 1042–01–01, with smaller fruit than Cannon Ball, has bred true for wilt resistance. The F_5 of crosses between Blacklee and strains of Garrison and Congo with wilt and anthracnose resistance have shown promise.

Cucumber. Yielding ability of commercial varieties was compared with disease resistant lines developed in South Carolina. Although Palmetto and Santee are well suited to local conditions, one of the new lines, SC 10, produced large fruits of good colour and quality.

Tomato. Yield data are given concerning replicated trials of 10 commercial varieties and 11 unnamed selections; STEP 89 and 135, Jefferson and Rutgers proved superior. The two latter varieties, Lakeland and several STEP lines showed some resistance to cracking. Ease of ripening at 69–70° F and 85–90% humidity after picking at the mature green stage varied; good colour was developed by Lakeland, Rutgers, Jefferson and STEP 135 and STEP 117 within 10 to 15 days.
Several lines developed at the Vegetable Crops Laboratory appeared favourable in both spring and autumn trials in respect of early maturity, fruit size and total yield.
Breeding has continued with Manahill (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 890) in an attempt to combine the disease resistance of this variety with early maturity, blossom end smoothness, short leafy vines and resistance to water logging; several promising selections have been obtained. A few selections from the F_3 of small-fruited tomatoes with resistance to bacterial wilt crossed with large-fruited varieties have combined field resistance to bacterial wilt and intermediate fruit size; these selections will be back-crossed to large-fruited parents.
Varietal trials for root knot resistance are to be continued. A number of selections in the F_5 of crosses made to add root knot resistance to the forms of resistance already possessed by Manahill have a longer fruit-producing season than Rutgers.

Bean. Contender, Top Crop, B 1643–1, B 2254 and B 1515–1–7–1–2 snap beans have produced vigorous growth and high yields of good quality in recent tests. Although B 1643–1 has given outstanding performances in the past, it showed susceptibility to mosaic in these trials.
Snap beans best suited to canning and freezing are listed. Prolific F_4 selections with white seeds and round pods show promise as dual purpose types equally suitable for processing or the fresh market.
Pole bean selections with resistance to common bean rust (*Uromyces appendiculatus*) have been made from progeny of (Urd x Tendergreen) x Kentucky Wonder.
Several snap and Lima beans surviving exposure to 22° F for 7½ hours may prove a valuable source of material for breeding frost resistant strains. A few Fordhook and Henderson Lima selections have shown sufficient uniformity for seed increase.
A breeding programme to develop horticultural varieties of cowpea has been initiated.

Sweet corn. Trials of 71 new selections were undertaken to determine their adaptability and resistance to *Helminthosporium;* none proved superior to standard varieties. Data concerning yields of numerous varieties are presented; Improved Sencross matured earlier than all other varieties. The results of canning and freezing trials are given.
In cooperation with other southern states, extensive trials of hybrid sweet corn were carried out.

1008. **Farm science and practice. 69th Annual Report of the Ohio Agricultural Experiment Station.**
1951 : Bull. No. 705 : Pp. 89.

Wheat. An investigation concerning the ease with which varieties can be harvested has shown that grain separates more readily from Vigo than from Butler; Thorne and Trumbull were intermediate in this respect.
The release of Seneca (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 938), formerly known as TN 1016–4 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2174), is reported.
Diurnal flowering habits show some correlation with degree of susceptibility to scab (*Gibberella Zeae*). Flowers of Trumbull, a variety with considerable tolerance of scab, are open for a short time only at mid-day whereas flowers of three susceptible varieties, Butler, Thorne and Seneca remain open for a much longer period during which temperature and relative humidity favour dispersal and growth of the pathogen.

Trumbull retains only half the number of anthers found in the other varieties.

Maize. After a very late planting, infection by corn borer was almost equally severe in hybrids normally showing wide variation in susceptibility. The need for early planting to avoid infestation by the second brood of borers is emphasized, with particular reference to varietal trials for resistance.

Forage plants. Analyses undertaken to determine differences in the carotene content of timothy varieties harvested at various stages of development show that carotene content declined with increasing maturity in all types. Late maturing strains contained a higher percentage of carotene than early maturing strains at any one harvesting date.

Although the recently introduced Du Puits lucerne (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 139) gave high yields at the first cutting it proved very susceptible to the potato leaf hopper and *Pseudopeziza* leaf spot as the season advanced. The average stand was reduced from 95% in April to 72% in October; local varieties maintained satisfactory stands under the same conditions.

Kenland red clover (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2741) has given outstanding yields during the past five years in central and southern Ohio where its resistance to southern anthracnose (*Colletotrichum Trifolii*) is particularly advantageous.

Fruits. A promising apple, as yet unnamed, has been developed from Gallia Beauty x Starking; over several years it has given high yields of good dessert quality.

Varieties of peach and strawberry suitable for canning and freezing are listed.

Cucumber. The release of Ohio MR 17 is reported (cf. Abst. 802).

Tomato. Commercially acceptable varieties have been crossed with five lines showing some degree of resistance to cracking; the resulting hybrids are promising.

Resistance to common diseases is being sought among numerous wild species. Some hybrid selections show a high degree of resistance to *Fusarium* wilt. Linkage is suspected between the gene for resistance to race 1 of *Fusarium Lycopersici* and that for jointless pedicel; both appear to be situated on chromosome V.

Snap bean. The results of analyses carried out over two years to determine varieties best adapted to canning and freezing are reported.

Sweet corn. Oh. 51K2 has been released to seed growers for increase. A promising selection from Purgold (P51 x P14) x Oh. 51K2 has been named Ohiogold 1.

Several varieties are recommended for processing.

1009. **Notes on current investigations, January to March 1951.**
Malay. Agric. J. 1951 : **34** : 86–91.

Rice. It is expected that improved strains of the varieties Nachin and Serendah Kuning will be available for distribution within the next three years.

Cacao. Legitimate and selfed progenies of selected Trinitario trees were further selected.

Oil palm. Controlled pollination and individual palm recording continued. Previous pollinations of dumpy palms with *pisifera* pollen from Nigeria have resulted in fruit bunches now approaching maturity.

Groundnut. Selections of Kedah have outyielded the unselected parent variety; they are now being compared with introduced varieties.

1010. **Annual Report of the Sarawak Department of Agriculture for 1950** : Pp. 47. (Mimeographed).

Sorghum. Appendix IX discusses the possibilities of growing this crop. Certain types have shown promise in trials.

Rice. Selection of lowland rice continued at Rantau Panjang.

Soya bean. The possibilities of soya bean cultivation as a means of increasing supplies of human food are examined in Appendix XI. Trials at Bedil House Garden suggest that a quick maturing yellow-seeded variety may be valuable for this purpose.

1011. **Twenty years of crop, pasture and fruit breeding in New South Wales 1930-1950.**
Sci. Bull. NSW Dep. Agric. 1950 : No. 72 : Pp. 164.

Progress made in breeding improved cereals, forage grasses and legumes, fibres, sugar cane, tobacco, oil seeds, tree fruits, soft fruits, root vegetables, green vegetables, beans and peas during this period is reviewed. Many investigations leading to the development of varieties with particular qualities such as earliness, winter hardiness or disease resistance are traced; gradual improvements in breeding techniques are indicated. The contributions made by introductions from overseas or other Australian states are emphasized, with particular reference to the cooperation of the Commonwealth Scientific and Industrial Research Organization.

1012. Åkerman, Å.
Johan Fredrik Lundberg. *10/8 1859 †20/4 1951. In memoriam. (**Johan Fredrik Lundberg. 10 August 1859 -20 April 1951. In memoriam**).
Sverig. Utsädesfören. Tidskr. 1951 : **56** : 121–23.
An account is given of the life and work of J. F. Lundberg, known to plant breeders for his work on potato breeding and hops.

1013. **Wageningen-Netherlands. Centre of agricultural science.** 1951 : Pp. 84.
This illustrated brochure provides information on the projects in progress at the Laboratory of Genetics, Institute of Plant Breeding and other laboratories and institutes of the Agricultural University, Wageningen, and of the Foundation of Plant Breeding and other autonomous institutes.

1014. Frandsen, K. J.
Erfaringer og resultater fra forædlingsarbejdet med fremmedbefrugtere. (**Experiences and results from breeding work with cross-pollinated plants**).
Nord. JordbrForskn. 1951 : **31-32** : 372–74.
This is a condensed report of the lecture and discussion in Abst. 215.

1015. Oehler, E.
Anciennes et nouvelles voies dans la sélection des plantes cultivées. (**Old and new ways in the breeding of cultivated plants**).
Rev. Romande Agric. Viticult. Arboricult. 1951 : **7** : 73–75.
In announcing the establishment of a Cytological Section at the Mont-Calme Research Station, Lausanne, the writer first outlines the evolution of the present-day breeding technique for cultivated plants, from early methods of selection and hybridization to the modern cytogenetic methods. The significance of the gene, the chromosomes, the induction of polyploidy and the creation of amphidiploids for the breeder of to-day is made clear. Tetraploid ryes are being bred at the Mont-Calme Station from the Swiss varieties Rothenbrunnen, Witzwil and Berna; and similar work on forage plants has been begun.

1016. Frandsen, K. J.
Nyere synspunkter inden for planteforædlingen. (**Recent viewpoints in the field of plant breeding**).
Horticultura 1950 : Nos 2 and 3 : Pp. 10.
The value of various methods of plant breeding evolved in the course of time by American and other investigators is considered with reference to their application to self and cross pollinated plants.

1017. D.L.F.s Generalforsamling 1951. (**The general meeting of the DLF**).
Tidsskr. Frøavl 1951 : No. 471 : 282–89.
According to this report of the Danske Landboforeningers Frøforsyning [Danish Farmers' Associations for Seed Production], breeding work continued along the usual lines (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 873), and strains of timothy, ryegrass, red clover and carrots were entered for trial at Danish government stations. The following strains were graded as first class: the timothy strains Øtofte A II and Øtofte II; the late ryegrass Øtofte II; the red clovers, Resistent Øtofte III, Øtofte III, both semilate types, and the early red clovers Øtofte III and Resistent Øtofte III.
At Toftø new strains of cucumbers, spring white cabbage and cauliflower were certified. New strains of red clover resistant to clover stem eelworm and *Sclerotinia* have been produced.

1018. Corriols.
Les cultures vivrières dans les territoires relevant du secteur soudanais de recherches agronomiques. Leurs améliorations. (**Food plants and their improvement in the territories within the sphere of the Sudan sector of agronomic research**).
Agron. Trop. 1951 : **6** : 412–19.
The cultivated food plants, mainly cereals and legumes, in cultivation in parts of Senegal, Haute-Volta, the Sudan, the Niger Territory, Northern French Guinea, Dahomey, the Ivory Coast and Guinea, are reviewed, with comments on present and future prospects of obtaining better yields and quality, as well as earliness and resistance to diseases, drought and attack by birds, by selection and breeding.

1019. **History of cultivated plants.**
Nature, Lond. 1951 : **168** : 448–49.
Papers on the origin and history of cultivated plants, given at the recent meeting of the Botany Section of the British Association, Edinburgh, are summarized. J. M. Horne discussed the introduction of exotic conifers into Great Britain and their influence on forestry. J. M. S. Potter examined the history of the apple. A paper by W. B. Turrill dealt with the olive. G. D. H. Bell outlined the history of the chief cereals. The origin of the potato was discussed by J. G. Hawkes.

1020. Lewis, D.
The science of plant breeding.
Chron. Bot. 1951 : **12** : 204–05.

It is suggested that the use of mixed strains to produce improved varieties in a short time while retaining genetic diversity for further selection as in cotton breeding in Peru (cf. *Plant Breeding Abstracts*, Vol. XX, Absts 1012 and 1013) could be applied to other crops. Heterogeneity might prevent complete susceptibility to epidemic diseases.

1021. Poddubnaja-Arnoljdi, V. A.
(The problem of dispermy and polyspermy in higher plants).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 1 : 3–30. [Russian].

A Mičurinite survey of literature on the problem of dispermy and polyspermy in higher plants, including some recent Soviet research on multiparental fertilization of wheat, maize, cotton, cabbage and tomato, is presented.

1022. **Plant material introduced by the Division of Plant Exploration and Introduction, Bureau of Plant Industry, January 1 to December 31, 1942 (Nos. 143682 to 145638).**
Plant Invent. US Dep. Agric. 1951 : No. 150 : Pp. 108.

Introductions, including economic species, received by the US Division of Plant Exploration and introduction during 1942, are listed. Numbers 143682 to 145638 are covered; it is pointed out that the register is not considered as a list of material for distribution.

1023. Boerger, A.
Adaptación y selección de plantas agrícolas en el Uruguay. **(Adaptation and selection of agricultural plants in Uruguay).**
IV Conf. Interamer. Agric. II Reun. Reg. Latinoamer. Agric. Aliment. 1950: 72–92.

Long years of experience have shown that in Uruguay varieties of most crop plants introduced from other countries have yielded less than the local varieties, which are adapted to the climatic conditions of the country and possess greater disease resistance. Some success has been obtained with certain wheat varieties produced in neighbouring countries and tested in Uruguay under an international scheme of cooperation between Brazil, Argentina and Uruguay; one of the varieties referred to is the Brazilian Río Negro, a hybrid between the Uruguayan variety Centenario and the Brazilian Surpreza. Promising results have been obtained too with certain double crosses of maize from the USA, with several introduced species of forage plants, some from abroad and some direct from the wild state, with sunflowers and with certain tropical plants such as rice and sugar cane.

Reference is made to the polycross method of breeding, which has been applied at the La Estanzuela breeding station to lucerne and, in a slightly modified form, to ryegrass and maize. The synthetic maize variety La Estanzuela 2 has yielded an average of 200 kg. per ha. more than the usual commercial varieties.

1024. **Plant introduction is a valuable service.**
Agric. Gaz. N.S.W. 1951 : **62** : 395–96.

The value of foreign introductions for supplementing local breeding material of the New South Wales Department of Agriculture is emphasized. A brief summary is given of notable cereal, forage and vegetable introductions which have led to yield increases and improved disease resistance.

1025. Buchholtz, W. F. and Wallin, J. R.
Plant disease research and extension in Iowa.
Plant Dis. Reporter 1951 : Suppl. No. 203 : 95–107. (Mimeographed).

This review of past and present work on diseases at the Iowa Agricultural Experiment Station includes some reference to breeding and variety testing in connexion with the following: crown rust of oats; root necrosis (*Pythium graminicola*) of barley and other crops; maize diseases; potato scab; water melon wilt (*Fusarium niveum*); and bacterial diseases of several crops.

1026. Richens, R. H.
Crop production in the Soviet arctic.
Polar Rec. 1951 : **6** : 227–36.

This review of crop production in the Soviet arctic includes a discussion of varietal adaptation to arctic conditions. It is noted that a large proportion of the arctic standards are introductions from elsewhere, many of the vegetable varieties, for instance, being well-known western European forms.

1027. Brandon, J. F.
West's High Plains. . . . New crop frontier.
Crops and Soils 1951 : **4** : No. 1 : 21–23.

A general account of wheat, oats, barley, grain and forage sorghums, forage grasses and legumes

grown on the Great Plains of the USA indicates the importance of research carried out at Akron, Colo., to produce crops with winter hardiness, drought resistance and early maturity. Breeders originally tried to make adaptable selections from imported varieties; more satisfactory results are now obtained from varieties bred locally for the exacting environment.

1028. **Overseas Food Corporation. Report and statement of accounts for the year ended 31st March, 1951.**
Appendix 2. Report of the scientific department for the crop year 1949–50 : 44–69.

A summary is included of the chief results of varietal trials of groundnut, sunflower, soya bean, safflower, castor bean, maize, sorghum, millets, wheat, barley and some minor crops in Tanganyika.

1029. **Annual Report of the Department of Agriculture, New Zealand, for the year 1950-51** : Pp. 100.

Regional trials of locally developed varieties and foreign introductions of sweet potato, sweet pepper, raspberry, black currant, gooseberry, strawberry, grape, cabbage, cauliflower, cucumber, tomato, beans and sweet corn are reported.

1030. BUNTING, A. H.
Agricultural research in the Groundnut Scheme, 1947-51.
Nature, Lond. 1951 : **168** : 804–06.

Varietal collections of groundnut, sorghum, safflower and soya bean are under investigation in Tanganyika; promising material is briefly indicated.

CEREALS

1031. WUNDERLICH, G.
Die Bedeutung Tschermaks für den österreichischen Getreidebau. (**Tschermak's importance for Austrian cereal growing**).
Z. Pflanzenz. 1951 : **30** : 478–83.

Tschermak aimed in most of his breeding work at the production of early, cold-resistant forms of high quality, suitable for cultivation in the Pannonian plain. Among his most important achievements in this direction the author mentions: the selection of early ripening, high yielding strains of Hanna barley, which have served as the parents of many other famous barleys, one of which was Tschermak's own Hanna x Kargyn; smooth-awned forms of both two and six-rowed barley; his two-rowed winter barley; his Marchfeld rye, still grown widely in Austria, distinguished by hardiness, earliness, fine husk and low cultural and water requirements; and Marchfeld winter wheat, an awned, early ripening, hardy variety with white grain.

1032. Memoria de la cuarta reunión de trigo, avena, cebada y centeno, 31 de Mayo y 1° de Junio de 1950, en la Estación Experimental Pergamino. (**Report of the fourth meeting on wheat, oats, barley and rye, 31 May and 1 June 1950, at the Pergamino Experimental Station**) 1950 : Pp. 259. (Mimeographed).

The report includes the following contributions related to plant breeding.

Godoy, E. F., Savoia, H. J. and Bruni, O. Importancia de la roya del tallo en 1949. (*Importance of stem rust in 1949*). (*pp. 16–20*).

The wheat variety Klein Cometa proved exceptionally free from attack. The most common biotype in 1949 was race 11.
In the discussion reference was made to some very promising resistant material from the cross Thatcher x (La Estanzuela x Rafaela 6).

Godoy, E. F., Savoia, H. J. and Bruni, O. La roya de la hoja en 1949. (*Leaf rust in 1949*). (*pp. 21–31*).

Information is presented on the distribution of the biotypes of *Puccinia rubigo-vera* var. *Tritici* in Argentina. The most frequent was race 49, followed by 20 and, lastly, 15, which was limited almost entirely to the varieties Klein Orgullo [Pride] and Ruso Mútico.
In the discussion it was pointed out by Vallega that two forms of race 15 apparently exist, one of which attacks the variety Klein Lucero [Star], hitherto considered resistant to all races.

Vallega, J. and Favret, E. A. Informaciones complementarias sobre especialización fisiológica de las royas de trigo y fuentes de resistencia. (*Subsidiary information on physiological specialization of the wheat rusts and sources of resistance*). (*pp. 32–33*).

The Argentine rust races are grouped according to the varieties they attack. The wheats at present grown are susceptible to the local races 15 and 17 of *P. graminis* var. *Tritici*; resistance is found in certain varieties from Kenya and Egypt. For *P. triticina*, Klein Lucero is resistant to all races except one of the two subtypes of race 15; hybrids of Mediterranean-Hope x Kawvale-Tenmarq are also promising.

Resistance to *P. glumarum* is found only in Chino 166 and its descendants.

Sarasola, J. A. and Campi, M. D. Reacción de variedades de trigo a Septoria nodorum *y* Septoria tritici *en la Argentina.* (*Reaction of wheat varieties to* S. nodorum *and* S. tritici *in Argentina*). (*pp. 35–36*).

Artificial inoculations carried out in the greenhouse with a collection of 1000 wheat varieties showed a number of them to be resistant to *S. nodorum*. None of the wheats grown in Argentina was resistant to *S. Tritici* but the following are recommended as promising: Bordeaux, Candeal La Previsión, Currel, Chino 166 x Lin Calel DIV 156, Chino 166 x Lin Calel DIV 157, Leap's Prolific, Leap's Sel. 1036, Leap's Sel. 12185, Ld. 276, OAC and Oned Renati.

Bruni, O., Godoy, E. F. and Savoia, H. J. Comportamiento a S. nodorum *y* S. tritici *de trigos Argentinos y extranjeros.* (*Reaction of Argentine and foreign wheats to* S. nodorum *and* S. tritici). (*pp. 37–49*).

A number of varieties, both local and foreign, displayed resistance to *S. nodorum*.

Cenoz, H. Principales fuentes de resistencia al carbón volador y a la carie del trigo. (*Principal sources of resistance to loose smut and bunt of wheat*). (*p. 50*).

Sinvalocho MA was the only Argentine wheat fully resistant to *Ustilago Tritici*; a number of moderately resistant varieties are enumerated. The most resistant to *Tilletia* spp. were Klein Pirámide [Pyramid], Kanhard Sel. Buck and Klein Orgullo, together with a certain number of varieties from abroad.

Olsen, H. A. Resistencia varietal en el trigo al ataque del pulgón verde de los cereales. (*Varietal resistance of wheat to green bug*). (*pp. 67–71*).

Among 17 wheat varieties tested none possessed absolute immunity to *Toxoptera graminum* but certain varieties such as Eureka, Sureño MA and Klein Cóndor possessed considerable resistance.

Rosenzvaig, J. and Niel, L. N. Resultado de cinco años de ensayos para determinar resistencia en variedades de trigo al ataque del pulgón verde de los cereales. (*Result of five years of tests to determine the resistance of wheat varieties to attack by green bug*). (*pp. 72–75*).

No varietal differences in degree of attack by *Schizaphis* (*Toxoptera*) *graminum* were detected.

Müller, H. L. and Niel, L. N. Determinación del grado de resistencia en centeno al ataque del pulgón verde de los cereales. (*Determination of the degree of resistance in rye to the green cereal aphid*). (*pp. 76–77*).

The rye variety Pico proved highly resistant.

Rojí, C. Evolución de la calidad de la producción triguera juzgada en base a la fuerza de los trigos. (*Evolution of quality of the wheat crop judged on the basis of the strength of the wheats*). (*pp. 108–22*).

In the quinquennial period from 1935 to 1950 there has been a progressive increase, ascribed to the result of plant breeding, in the quality of Argentine wheat as measured by protein content and strength of the flour.

Klein, E. Orientación en el mejoramiento de la calidad industrial de los trigos. (*Orientation in the improvement of the industrial quality of wheats*). (*pp. 133–36*).

The Argentine wheats have, as a result of the efforts of plant breeders in the last 30 years, been converted from medium soft wheats to very hard, some of them coming into the top Manitoba class. In order to maintain and improve yielding capacity, further breeding must improve their standing capacity.

Haertlein, H. and Lemos, O. R. El pronóstico anticipado del comportamiento molinero de nuevas variedades de trigo en base de la molienda de ensayo en pequeña escala. (*Forecasting the milling quality of new wheat varieties on the basis of small-scale milling tests*). (*pp. 137–45*).

Using a Buehler mill with a 65% extraction rate valuable indications of the milling quality can be obtained with small samples of new varieties being bred.

Kaufmann, F. Ceniza que se encuentra en la harina elaborada de las distintas variedades. (*The ash found in flour prepared from different varieties*). (*p. 146–51*).

Flour extracted from different wheat varieties in a Buehler mill at a 60% extraction rate showed clear differences in ash content. The proportion of ash lost in preparing the dough with water also differed. The variety with the lowest ash content was Cometa, whilst Inca, with a higher initial content, lost more in the preparation of the dough.

Lemos, O. R. and Haertlein, H. Comportamiento industrial de material de crianza de trigo, en Pergamino. (*Industrial behaviour of breeding material of wheat at Pergamino*). (*pp. 157–58*).

Some of the new hybrids tested have surpassed the standards in strength and baking quality. The best among the semihard group were line G–1–1–115–1–1 and (Bagé x H 44) x Sinvalocho and some of its hybrids, and in the hard group two selections from H 44 x Sinvalocho.

Leiboff, R. O. and *Rath, J. Dos nuevas variedades de trigo obtenidas en la Estación Experimental de Guatraché: Sureño M.A. y Cheg 161 x 8842.* (*Two new wheat varieties obtained at the Guatraché Experiment Station: Sureño MA and Cheg 161 x 8842*). (*pp. 159–63*).

Sureño MA is a selection from a cross between Cheg 3 and 9/10/33 [(Barleta x Ruso x Chino) x Record] x Thatcher, made in 1937; it is semi-resistant to *Puccinia triticina* and seems to possess resistance also to *P. glumarum, P. graminis, Septoria,* frost and drought. In yield it has surpassed all other varieties almost every year since 1943 and in quality it corresponds to the commercial hard class.

The second hybrid is a selection from a cross made in 1939; it too is resistant to the main diseases and to frost and drought. It is equal to La Previsión 25 in yield, and in quality is classed as hard.

Olsen, H. A. Crianza de nuevas variedades de trigo en la Estación Experimental de Bordenave. (*Breeding new wheat varieties at the Bordenave Experiment Station*). (*pp. 164–66*).

A large number of hybrid selections are giving promise in respect of resistance to *P. graminis* and other diseases and of grain quality and yield.

Chabrillón, A. L. Estado actual de los trabajos de crianza de trigo en Tezanos Pinto con respecto a la resistencia a las principales enfermedades. (*Present state of wheat breeding work at Tezanos Pinto, with reference to resistance to the principal diseases*). (*pp. 167–68*).

Hybrids of Klein 157 x UT 3 are highly resistant to *P. graminis* and have outyielded the standards Klein Cometa and Benvenuto Inca considerably. Other resistant hybrids are also under observation. Separate sets of hybrids have been made for resistance to *P. triticina* races 20 and 49 on the one hand and race 15 on the other.

In breeding for resistance to *Ustilago Tritici,* 38 MA and its descendants are being used and so far the hybrids have proved immune in the field. Mediterranean, Benvenuto Inca, Klein Lucero and Klein 157 are being used for resistance to *Septoria nodorum;* most of the varieties being tested are resistant to *S. Tritici.*

Albrecht, A. R. Estado actual de los trabajos de crianza de trigo en la Estación Experimental de Rafaela. (*Present state of wheat breeding work at the Rafaela Experiment Station*). (*p. 169*).

Rigorous selection for resistance to *P. graminis* and *P. triticina* has given a number of promising individuals showing combined resistance.

Chabrillón, A. L. Comportamiento de las variedades de trigo ensayadas por la red oficial en Tezanos Pinto, durante el trienio 1947–1949. (*Behaviour of the wheat varieties tested by the official testing network at Tezanos Pinto in the three-year period 1947–49*). (*pp. 170–75*).

The best yields have been given by Klein Cometa, Sinvalocho MA, Benvenuto Inca, and among the new varieties the two spring wheats Massaux 5 and Olaeta 1078.

Albrecht, A. R. Rendimiento de nueve variedades de trigo y sus épocas óptimas de siembra en Rafaela. (*Yield of nine wheat varieties and their best sowing times at Rafaela*). (*pp. 176–78*).

In the first sowing Buck Quequén was the best, in the second Klein Cometa and in the third Benvenuto Inca.

des Rotours, V. F. Comportamiento de variedades de trigo en la Estación Experimental de Manfredi. (*Behaviour of wheat varieties at the Manfredi Experiment Station*). (*pp. 179–85*).

Sinvalocho MA and 38 MA were the least attacked by *Tilletia* spp., and Sinvalocho MA the least by *P. triticina.* The varieties giving the best yields at each of two sowing dates are enumerated.

Garbini, S. E. Comportamiento de variedades de trigo en Pergamino. (*Behaviour of wheat varieties at Pergamino*). (*pp. 186–91*).

Klein Aniversario, Sinvalocho MA and Klein Otto Wulff proved resistant to *P. triticina* and Klein Cometa, Klein Cóndor and Klein Aniversario to *P. graminis.*

The best yields were given by Benvenuto Inca and Klein Cometa.

Leiboff, R. O. Rendimiento de 12 variedades de trigo y sus épocas óptimas de siembra en Guatraché. (*Yields of 12 wheat varieties and their optimum sowing times at Guatraché*). (*pp. 192–96*).

The variety Benvenuto Inca was notably superior to others in yield over a period of eight years. Eureka FCS was the most drought resistant but did not equal Inca in yield even in drought years.

Ballari, C. P. Ensayo de orientación con 8 variedades de T. durum *en la Sub-Estación Experimental de Pico.* (*Preliminary test with 8 varieties of* T. durum *at the Pico Experiment Substation*). (*pp. 197–98*).

The La Previsión selection of Candeal exceeded the original Candeal by 35% in yield. It was also most resistant to *P. glumarum*. The next best varieties were La Estanzuela and Golden Ball.

Tessi, J. L. Razas de "Pseudomonas coronafaciens" y comportamiento de algunas avenas. (*Races of* P. coronafaciens *and the reaction of certain oats*). (*pp. 199*).

Most oat varieties resistant to *P. coronafaciens* proved resistant to *P. striafaciens* too. A second race of the latter organism has been detected.

Tessi, J. L. Estado actual de los trabajos sobre Xanthomonas translucens *var.* cerealis. (*Present state of the work on* X. translucens *var.* cerealis). (*p. 200*).

A number of barley varieties resistant to the parasite are listed.

Leiboff, R. O. and Rath, J. Trabajos de crianza en avena, cebada y centeno en la Estación Experimental de Guatraché. (*Breeding work with oats, barley and rye at the Guatraché Experiment Station*). (*pp. 201–04*).

Oats. The most promising selections are those from a hybrid population of *Avena byzantina* x *A. fatua*.

Barley. Two promising forage barleys have been obtained from the crosses Cheg 176 x (Winter OL 37 x Vaughn Smooth) and Cheg 177 x (Finley OL/37 x Vaughn Smooth) respectively. Certain other hybrids also show promise. A selection of malting barley from the cross 202 x (Stadler R 40 x Orel) has exceeded the standards in yield and hectolitre weight.

Rye. A single plant displaying marked resistance to green aphids has been selected and selfed. The resulting population has exceeded other varieties in yield of grain and forage.

Parodi, R. A. Nueva variedad de "cebada negra" de buen comportamiento forrajero. (*A new variety of "black barley" giving good results as a forage plant*). (*pp. 205–08*).

A form of *Hordeum* aff. *agriocrithon* has displayed resistance to drought, cold, *Helminthosporium* sp. and green aphid. It is also more appetizing to stock and resists grazing better than other forage barleys.

Villar, A. D. Trabajos de crianza en cebada forrajera que se realizan en la Estación Experimental de Oliveros. (*Breeding work with forage barley carried out at the Oliveros Experiment Station*). (*pp. 209–10*).

Notes are given on a number of forage barley varieties and their resistance to *Erysiphe graminis*, *Rhynchosporium Secalis* and *Helminthosporium teres*. A number of crosses have been made using varieties resistant to mildew.

Senín García, N. W. R. de. Mejoramiento de la cebada cervecera. (*Improvement of malting barley*). (*pp. 211–13*).

The selection of four and six-rowed barleys for a low proportion of glutelin and edestin as against hordein and leucosin is recommended for the improvement of Argentine malting barleys.

Williamson, J. and Ballari, C. P. Comportamiento del centeno Pico obtenido por la Sub-Estación Experimental de Pico. (*The behaviour of Pico rye, produced by the Pico Experimental Substation*). (*pp. 214–18*).

Pico rye was selected from local material and in tests conducted over a 13 year period has exceeded all introduced forms in yield of both grain and fodder, and also in resistance to green aphids, cold and drought.

Parodi, R. A. Selecciones de centeno de Manfredi. (*The Manfredi rye selections*). (*pp. 219–21*).

Selections made at the Manfredi station from local material have proved superior to other varieties in resistance to green aphid and in yield of grain and fodder.

Müller, H. L. Ensayos comparativos de rendimiento con cereales forrajeros bajo condiciones de pastoreo. (*Comparative tests of yield of forage cereals under conditions of grazing*). (*pp. 222–25*).

Yielding ability is determined by cutting and weighing unit areas periodically; the plots were

also grazed periodically and resistance to grazing was judged by counting the stand in unit areas after grazing.

Chabrillón, A. L. Comportamiento de variedades de avena, cebada y centeno, ensayadas por la red oficial en Tezanos Pinto, durante el trieño 1947/49. (*Behaviour of varieties of oats, barley and rye tested by the official variety testing service at Tezanos Pinto in the three-year period 1947–49*). (*pp. 226–29*).

The oat variety Bagé Sel. Klein gave the best results in yield of forage, reaction to cutting and grain yield.

Briggiler, H. A. Comportamiento de cereales forrajeros en Rafaela. (*Behaviour of forage cereals at Rafaela*). (*p. 230*).

In tests of forage yield, the best varieties were Buck 20 and Buck 152 oats, Buck 111, Primor x Trebi and Trebi Sel. Klein barleys and Pico and Massaux Hybrid ryes.

Garbini, S. E. Comportamiento de variedades de avena, cebada y centeno ensayadas en Pergamino. (*Behaviour of varieties of oats, barley and rye tested at Pergamino*). (*pp. 231–34*).

The variety La Previsión 13 of *A. byzantina* gave much better yields than other oats. Buck 20 and 152 were resistant to rust and Klein Mar to frost.

In forage barleys, Buck 111 proved outstanding in yield and resistance to *Helminthosporium teres*.

Pico proved much the best rye in yield and Massaux Hybrid was the most resistant to *Puccinia dispersa*.

Ballari, C. P. Comportamiento de variedades de avena y cebada en Pico. (*Behaviour of varieties of oats and barley at Pico*). (*pp. 235–44*).

The *A. byzantina* varieties La Previsión 13, Buck 20 and Buck 152 and the barleys Massaux EM, Trebi Sel. Klein and Primor x Trebi FCS had the best combination of grain and forage yield.

Leiboff, R. O. and Rath, J. Rendimiento en forraje y grano de variedades de avena, cebada y centeno a través de cuatro años de ensayos en Guatraché. (*Grain and forage yields of oats, barley and rye during four years of tests at Guatraché*). (*pp. 245–49*).

The best yields of grain and fodder were given by the *A. byzantina* varieties La Previsión 13, Buck 20 and Buck 152 of oats, and Primor x Trebi FCS and Buck 11 of barley; Massaux Hybrid and Klein CC ryes gave the best yield of forage and Pico the most grain.

Parodi, R. A. Comportamiento de cereales forrajeros en Manfredi y Cārcano. (*Behaviour of forage cereals at Manfredi and Cārcano*). (*pp. 250–57*).

The oats Klein Mar and Buck 20 produced the most forage at Manfredi, La Previsión 13 and Buck 20 the most grain. The varieties with the best combined yields of fodder and grain were Buck 111 and Trebi Sel. Klein barley, and Pinto rye.

1033. KOBLET, R.
Bericht über die Tätigkeit der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1949/50. (**Report for 1949-50 on the work of the Federal Agricultural Research Institute, Zürich-Oerlikon**).
Landw. Jb. Schweiz 1951 : **65** : 461–532.

Winter wheat. Breeding for hybrids which will be more resistant than Probus to lodging and to brown rust is being continued. Mont-Calme 245 has been crossed with Vilmorin 27 to obtain material for breeding for resistance to *Septoria*. A new strain, Irlbach, derived from Ackermann, is undergoing final variety trials. The cross Vilmorin x Tassilo continues to show promise.

Spring wheat. From the cross Huron x Newthatch, 18 strains showing good resistance to mildew and brown rust have been selected. A new variety, Liechti's Weihenstephan spring wheat, showed a notable increase in yield over Huron. Most of the spelt varieties of the 1949 harvest equalled the wheat MC 245 in baking quality.

Barley. The Belgian winter barley Gembloux 456 was recommended provisionally for inclusion in the standard collection. In a test with foreign spring barleys, some of the varieties from southern Germany were found to be less susceptible to mildew than the varieties from other European countries.

Rape. With the aim of finding high yielding varieties with pods which do not burst, Lembke's commercial seed, Lembke's Nonbursting, Dippe's Resistant to Bursting and German New Variety (1950/51) were tested, but the differences in the amount of grain lost were small.

1034. Gluščenko, I. E. and Pičikin, A. G.
(Producing vegetative hybrids in cereals by transplanting the embryos).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. **18** : 29–36. [Russian].

Vegetative hybridization work at the USSR Institute of Genetics with wheat and rye, involving embryo grafts on foreign endosperm is described. The hybrids included: the spring wheat Lutescens 62 on a branching wheat, on a green-strawed winter rye and on the spring rye Jarica Vostočnosibirskaja [East Siberian Spring Grain]; the above-mentioned branching wheat on the spring wheats Lutescens 62 and Caesium 111 and on the winter wheat Lutescens 329; Caesium 111 on the branching wheat; Lutescens 329 on the branching wheat; the green-strawed winter rye on Lutescens 62 wheat; and the spring rye Jarica Vostočnosibirskaja on Lutescens 62. The grafted hybrids had taller straw and higher 1000 grain weights than the controls. Other changes in the plants due to vegetative hybridization are also described.

1035. Schmidt, J. W. and Frolik, E. F.
The effects of thermal-neutron irradiation of maize and barley kernels.
Res. Bull. Neb. Agric. Exp. Sta. 1951 : No. 167 : Pp. 29.

Results already summarized in *Plant Breeding Abstracts*, (cf. Abst. 1131) are presented with additional data on the morphological effects of similar neutron irradiation on Spartan barley seed. Although severe treatment failed to kill the barley immediately, germination was reduced to 4% after exposure to neutrons for 8 min., and many plants died later. Neutrons also caused dwarfing, leaf mottling, early development of large numbers of narrow leaves and low percentage seed set.

1036. Åkerman, Å., Lindberg, J. E. and Augustin, S.
Undersökningar av kvaliteten hos 1950 års brödsädesskörd. (**Investigations on quality of the bread cereal crop of the year 1950**).
Sverig. Utsädesfören. Tidskr. 1951 : **61** : 224–53.

In continuation of previous work (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 171 and Vol. XXI, Abst. 1758), the current report by the Cereal Laboratory on behalf of the National Agricultural Council for Sweden records the results of chemical analysis and tests of flour quality and baking value of spring and winter wheats and rye varieties of the 1950 harvest in Sweden.

1037. Mayr, E.
Ergebnisse der österreichischen Landsortenforschung bei Getreide in den letzten zwei Jahrzehnten. (**Results of the Austrian investigations on land varieties of cereals in the last twenty years**).
Z. Pflanzenz. 1951 : **30** : 434–44.

The systematic collection and study of the land races of the Austrian alps was begun immediately after the first world war and was virtually completed some fifteen years ago. The forms collected are maintained at the plant breeding station at Rinn in the Tyrol. The characteristics of the main types are described. They include the Alpine winter wheat which, in spite of weak straw and susceptibility to rust, is distinguished by regular and reliable yield, capacity to withstand long periods under snow, and high baking quality; selections of *Triticum compactum* capable of growing on high ground up to 1600 m. and over, where no other wheat will thrive; the Pumper six-rowed spring barley which tolerates snow and frost until the time of ear emergence, from which mildew-resistant hybrids have now been obtained by crossing with the Weihenstephan mildew resisters; and the Tuxer naked six-rowed barley which has grain of high malting quality. The land varieties have proved disappointing in resistance to diseases and lodging, but are valuable in respect of their high germination energy, low heat requirements and reliable yielding capacity.

1038. Pesola, V. A.
Lantstråsädessorternas tidigare och nutida utbredning i Finland samt tillvaratagningen av desamma. (**The former and present distribution in Finland of land varieties of cereals and a survey of them**).
Nord. JordbrForskn. 1951 : **31-32** : 370–71.

What has been done so far in Finland with regard to the study of land varieties of cereals and pulses and their use in breeding is briefly recorded.

1039. Kopetz, L. M.
Gedanken zum Problem der Standfestigkeit in der Getreidezüchtung. (**Remarks on the problem of standing capacity in cereal breeding**).
Z. Pflanzenz. 1951 : **30** : 418–21.

It is pointed out that high productivity, and also lodging, are favoured not by high doses of

nitrogen alone but by a balanced manurial system which enables the plant to utilize the nitrogen to the best advantage. Every improvement in standing capacity which the breeder achieves is a direct contribution to increased productivity as it enables the farmer to employ more intensive manuring.

1040. Report of cooperative uniform cereal rust observation nurseries for the year 1950.

Publ. U.S. Dep. Agric., Agric. Res. Admin., Bur. Pl. Industr., Soils, Agric. Engin. Beltsville, Md. 1951 : No. 32 : Pp. 22. (Mimeographed).

Introductory statement.

Rodenhiser, H. A. and Lowther, C. V. (*p. 2*).

During 1950, 115 cereal rust observation nurseries were grown at 49 stations in 28 States and at Winnipeg, Man.

Wheat rust nurseries.

Levine, M. N., Stakman, E. C. and Loegering, W. Q. Puccinia graminis tritici. (*pp. 2–6*).

Data on the reaction of spring and winter wheat varieties to stem rust and on the distribution of physiological races are summarized. In the spring wheat nurseries, Frontana and McMurachy exhibited a particularly high degree of resistance. One line among the soft red winter wheats, viz. CI 12658 (Frondoso x Trumbull-Hope-Hussar), averaged less than 1% coefficient of infection. The following hard red winter hybrids fell below 1%: CI 12329 (Comanche x Mediterranean-Hope), CI 12508 (Marmin x H 44–Minhardi), CI 12704 (H 44 x Minturki[3]), CI 12661 (Minturki x *Triticum Timopheevi*) and CI 12662 (Minturki x *T. Timopheevi*). The only resistant line among the semihard wheats was CI 11682 (Hope x Hussar), with an infection coefficient of 1·3%.

Johnston, C. O. Puccinia rubigo-vera tritici. (*pp. 6–11*).

Observations on the reaction of spring and winter wheats to leaf rust and on the distribution of races are recorded. Among the spring wheats, the Brazilian *T. vulgare* variety Frontana, the durums Mindum and Cappelli, and *T. Timopheevi* showed the lowest average coefficient of infection. Among the *T. vulgare* wheats, Exchange had the second lowest coefficient, followed by the Brazilian variety Río Negro and Lee (Hope x Timstein). Resistance derived from Hope is no longer sufficient in spring wheats.

In the winter wheat nurseries, the soft wheats CI 12757 (Wabash x American Banner), CI 12659 (Frondoso x Trumbull-Hope-Hussar) and CI 12536 (Leapland x Fronteira) exhibited the lowest average infection. Several other soft red winter hybrid lines had low degrees of infection. The most resistant hard red winter selection proved to be CI 12407 (Marquillo-Oro x Oro-Tenmarq) with an average coefficient of 2%, followed by CI 12128 (Kawvale-Marquillo x Kawvale-Tenmarq), CI 12459 (Hard Federation-Kawvale x Mediterranean-Hope), CI 12406 (Marquillo-Oro x Oro-Tenmarq) and CI 12662 (Minturki x *T. Timopheevi*). Leaf rust resistance derived from Hope appears to be more effective in winter than in spring wheats.

Oat rust nurseries.

Levine, M. N., Stakman, E. C. and Loegering, W. Q. Puccinia graminis avenae. (*pp. 11–14*).

Information on varietal reactions to stem rust and on the distribution of races is provided. The following varieties averaged coefficients of infection below 10%: Canuck, 0·2%; Bonham, 9·6%; Cherokee, 7·5%; Cedar, 7·4%; Nemaha, 6·6%; Richland, 4·9%; Minrus, 2·4%; and the multiple hybrid CI 5013, 5·4%.

Murphy, H. C. Puccinia coronata avenae. (*pp. 14–19*).

Data are reported on the reaction of varieties to crown rust and on the distribution of races. Out of the tested varieties, Landhafer, Ukraine, Victoria, Trispernia and Santa Fe were the most resistant. Among the new varieties and selections studied, CI 5401 (Anthony-Bond x Boone) and CI 5400 (Santa Fe x Clinton) were outstanding for their resistance. In investigating physiological races of crown rust, Landhafer, Santa Fe, Santa Fe x Clinton and CI 5401 (Anthony-Bond x Boone) were resistant in the seedling stage to all of the 293 isolates used. Races attacking Victoria and its derivatives appear to be gradually increasing in prevalence and distribution.

Barley rust nurseries.

Levine, M. N., Stakman, E. C. and Loegering, W. Q. Puccinia graminis. (*pp. 19–21*).

The named varieties most resistant to stem rust comprised Kindred, Chevron, Vantage, Moore, Plains, Valentine, Hietpas 5 and Ezond, which scored average coefficients of infection ranging from 0·5 to 5·9%. CI 7123 and three other unnamed hybrids had an average coefficient ranging from 0·4 to 1·8%. In addition to

varietal reactions, data on the distribution of races are recorded.

Levine, M. N. and *Stakman, E. C.*
Puccinia hordei. (*pp. 21–22*).

Data are given on the reaction of varieties to barley leaf rust and on the distribution of physiological races. CI 7123 (Wisc. H 42–5–4–9–9) was the only barley outstandingly and uniformly resistant to both leaf and stem rust. This hybrid selection and also Morocco (CI 6311), Quinn (CI 1024), Bolivia (CI 1257) and Egypt (CI 3410) had an average coefficient of leaf rust infection of less than 1%.

1041. Fuchs, W. H.
Fortschritte der Resistenzzüchtung bei Getreide im letzten Jahrzehnt. (**Progress in breeding for resistance in cereals in the last ten years**).
Z. Pflanzenz. 1951 : **31** : 1–41.

This is a continuation of the article mentioned in *Plant Breeding Abstracts*, Vol. XX, Abst. 1512 and comprises a review of the literature appearing in the period 1939–1949 on cereal rusts, 280 titles being referred to in the bibliography.

WHEAT

1042. Del Vecchio, A.
L'R 16 nel Pesarese. (**R 16 in the Pesaro region**).
G. Agric. Domen. 1951 : **61** : p. 289.

R 16 (Pegarih x Vase Njhai) is a new wheat variety produced under the auspices of the Società Produttori Sementi di Bologna [Bologna Seed Producers' Association]. It is an early bearded wheat recommended for hillsides and moderately fertile land in the plains, in which localities it has outyielded Mentana and Virgilio. The new variety is resistant to cold and lodging.

1043. Yatsuyanagi, S. and Kikuchi, M.
(**The influence of X irradiation on wheat grains**).
Nogyo Engei (Agric. Hort.) 1949 : **24** : 541–43. [Japanese].

Data are provided on the percentage germination, growth rate, maturation period, culm and ear lengths, and number of ears of seven Japanese wheat varieties subjected to X irradiation. No evidence was found to support the theory that X irradiation has a vernalizing effect.

1044. Moschini, E.
Razze di grano dell'Istituto di Pisa. (**Varieties of wheat from the Pisa Institute**).
G. Agric. Domen. 1951 : **61** : p. 305.

Brief descriptions of wheats, obtained by hybridization at the Pisa Agronomic Institute, and their performance in various districts of Italy are given in recommending them to farmers for certain regions and types of soils. The varieties have been provisionally called Trento, Pisa, Grosseto, Livorno, Ancona and Brescia.

1045. Baraev, A. I.
(**The breeding and cultivation of hard wheat**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. **3** : 7–23. [Russian].

At Krasnyĭ Kut, Uraljsk, Bezenčuk, Čkalov, and Kamyšino, breeding is in progress to develop early maturing hard wheats giving high yields of grain rich in protein and having plants with vigorous root systems. Varieties of hard wheat which will yield good crops under irrigation are also being sought. Several lines of Melanopus (1932, 2556, 2065, 2624), Hordeiforme (1408, 1663, 1726, 5866), Local Kubanka and other varieties have already been produced. These are compared with the soft wheat, Erythrospermum 841, and with the hard wheats, Melanopus 69 and Hordeiforme 189, and shown to possess some of the characters desired.

1046. (**Norin 60 and Norin 61**).
Nogyo Engei (Agric. Hort.) 1949 : **24** : 573–74. [Japanese].

Two new wheats adapted to the warm wet climate of Kyushu and showing some resistance to the local fungous diseases are described. Norin 60 [Ministry of Agriculture and Forestry 60] was selected at the Miyazaki Experimental Station from Fukuoka 18 x Shinchucho [New Mid-long]; Norin 61 was derived from the same cross, but is three days earlier.

1047. Johnston, J. W. (Jun.) *et al.*
Mejoramiento del cultivo de trigo en Guatemala. (**Improving wheat cultivation in Guatemala**).
Bol. Divulg. Dep. Agron., Guatemala 1951 : No. **3** : Pp. 24.

Comparative tests have shown the superiority of the variety Supremo 211. A cooperative wheat breeding programme between the Quezaltenango Research Station, Guatemala, and the Rockefeller Foundation in Mexico is outlined.

1048. Truhinova, A. T.
(**Changing the spring wheat Milturum 321 into a winter wheat under the conditions of Siberia and the southern Urals**).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 66–99. [Russian].

Directed changes were obtained in the spring

wheat Milturum 321 at the Čeljabinsk State Breeding Station and at the Siberian Scientific Research Institute of Grain Farming, Omsk, when it was planted for several years in succession in late autumn. The proportion of plants having a winter habit increased progressively each year. The increase in the number of winter forms was due to the reproduction of the winter forms obtained in the first year of the experiment and to the development of the winter habit by other individuals in later years. Earlier dates of sowing in the autumn had the effect of intensifying the rate of production of winter forms in the next generation.
The change from spring to winter habit was sudden, and the winter forms, obtained after directed training in the first year, were as hardy as the plants which acquired the winter habit in two, three or four years.
In some families from single ears of the changed spring wheat, segregation occurred in respect of habit and some morphological characters.

1049. Glinjanyĭ, N. P.
(Experiments on the heritable change of spring wheat into winter wheat).
Agrobiologija (Agrobiology) 1951 : No. 3 : 19–29. [Russian].

The effect of continued late sowing upon the spring habit of wheats was studied with many varieties at the Kazah State University. The most recent experiments showed that no changes occurred in the early maturing varieties Graecum 289, Pseudoturcicum 2115 and Erythrospermum 341.
The later maturing varieties Graecum 20586, Lutescens 25157, Lutescens 31235, Meskren and Erythrospermum 841, produced some spring and some winter forms in their progenies. All these showed variability in respect of their growth periods, disuniform development being observed in individuals within the same family.

1050. Kihara, H. and Yamashita, K.
(5 linkage groups in Einkorn wheats).
Idengaku Zasshi/Jap. J. Genet. 1947 : 22 : 15–16. [Japanese]

The linkage relations between mutants of *Triticum monococcum* and *T. aegilopoides* obtained by X irradiation were investigated using (1) the evidence from F_2 segregation ratios and (2) data from translocation studies. As a result of these studies, five linkage groups were identified. A diagram of the characters pertaining to each linkage group is given.

1051. Atkins, I. M.
Quanah wheat.
Bull. Tex. Agric. Exp. Sta. 1951 : No. 734 : Pp. 10.

This bulletin gives details of Quanah (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 973), the new hard red winter wheat developed by the Texas Agricultural Experiment Station in cooperation with the US Department of Agriculture.

1052. Chin, K.-C.
Pigment pourpre dans les hybrides des blés, français et chinois. **(Purple pigment in the hybrids of French and Chinese wheats).**
C.R. Acad. Sci. Paris 1944 : **218** : 1004–06.

The two pigmented Chinese wheats Blé pourpre de Ngan-King [Purple Anking] and Blé rouge de Han-Kéou [Red Hankou] were crossed with the unpigmented varieties Manitoba and D.C. Tourneur. The range of pigmentation types obtained in each case is described.

1053. Chin, K.-C.
Le pigment pourpre dans les hybrides de blés européens, africains et canadiens. **(Purple pigment in hybrids of European, African and Canadian wheats).**
C.R. Acad. Sci. Paris 1944 : **219** : 78–80.

The mode of segregation of pigmentation is described in the offspring of the following three crosses between pigmented and unpigmented wheats: PLM 1 x [T 105 Garnet x (Allora x Florence) 12104/L]; Blanc Sisonili [White Sisonili] x PLM 1; and Canada Pionnier x Pusa 4–1076/5/4.

1054. Forlani, R.
Ibridi di *Triticineae* resi fertili con colchicina. **(Hybrids of the *Triticineae* made fertile by colchicine).**
Ann. Sper. Agrar., Roma 1951 : **5** : 1079–94.

Fertile hybrids of *Triticum turgidum* x *T. monococcum* and *T. dicoccum* x *T. monococcum* were produced by colchicine treatment.

1055. Chin, K.-C.
Pigment pourpre dans les hybrides de blés, engrains et froments (*Tr. monococcum* x *Tr. vulgare*). [**Purple pigment in the hybrids of Einkorn and bread wheats (*T. monococcum* x *T. vulgare*)**].
C.R. Acad. Sci. Paris 1944 : **218** : 975–77.

While both unpigmented and pigmented individuals appeared among the segregates of

Triticum vulgare type in advanced generations of the above cross, all segregates of the *T. monococcum* type were pigmented.

1056. Nakajima, G.
(Cytogenetical studies on the hybrid between *Triticum compactum* and rye).
Idengaku Zasshi/Jap. J. Genet. 1947 : **22** : 23–24. [Japanese].

The F_1 of *T. compactum* x rye is highly sterile, but one fertile individual was obtained which gave rise to an F_2 generation with chromosome numbers ranging from $2n = 47$ to $2n = 58$.

1057. Maliani, C.
Indagini italiane sui grani perenni. **(Italian investigations on perennial wheats).**
G. Agric. Domen. 1951 : **61** : p. 344.

Reference is made to work by Forlani (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2481) in which successful crosses have been obtained between wheat and *Agropyron glaucum* and *A. elongatum*. Some of the hybrid plants are now in their third year and are growing more vigorously than the *Agropyron* parent; they have a very high tillering capacity and particularly strong spring growth. The hybrids with *Triticum vulgare*, after being mown for hay, form ears later in the summer; they are sterile, but fertile forms have been obtained after treatment with colchicine.
It is hoped from these crosses to obtain perennial forms of value for certain special regions as fodder plants, and annual types possessing some of the valuable characters of *Agropyron* such as low cultural requirements.

1058. Sisakjan, N. M.
(Metabolism in plants after the induction of directed changes).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. **2** : 30–43. [Russian].

Changes in anabolic and catabolic processes in wheat, cotton and tomato plants are discussed. Directed changes were obtained by Mičurinite methods, including vernalization of wheat and cotton, training wheats for the spring or winter habit and vegetative hybridization of tomato. Several soft wheats were obtained from the hard wheats Melanopus 69 and Hordeiforme 10 by training for the winter habit. The metabolic processes of the new soft wheats resembled those of other soft wheats.

1059. Voitčišin, N. V.
(Changing soft wheat into hard wheat). Agrobiologija (Agrobiology) 1951 : No. 3 : 133–34. [Russian].

Reference is made to training winter wheats for the spring habit at the North Osetian State Breeding Station. Several instances of changes occurring in the *erythrospermum* wheats, Jubileĭnaja Osetii [Jubilee of Osetia] and Osetinskaja 3 and 4 [Osetian 3 and 4] are reported. Jubileĭnaja Osetii produced several plants of the *ferrugineum*, *lutescens* and *barbarossa* type. The most remarkable changes in this variety were observed in 1950, when some plants produced ears having the morphological characters of both hard and soft wheats. Their ears were awnless, except for the short awns on the distal ends of the spikelets, their keels were broad and pronounced and extended to the basal ends of the smooth empty glumes. The keel teeth were broad and short as in hard wheats. However the ears of these plants were lax and the grains resembled those of soft wheats.

1060. Karapetjan, V. K.
(Some new data on directed changes of hard wheat into soft wheat by the method of sowing in late autumn and some facts relating to the conversion of wheat into rye).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 47–65. [Russian].

Genetic changes in wheats were obtained by altering external conditions at the Institute of Genetics of the USSR Academy of Sciences, Moscow. The *Triticum durum* varieties Melanopus 69 and Hordeiforme 10 were changed into various botanical varieties of *T. vulgare* when planted for several years in the autumn. The soft wheats which resulted from Melanopus 69 comprised *lutescens*, *erythrospermum* and *milturum* forms, while those which resulted from Hordeiforme 10 included vars. *compactum*, *ferrugineum*, *erythrospermum*, *milturum*, *caesium* and *lutescens*.
Instances of the conversion of wheat into rye occurred with the Armenian winter soft wheat varieties Karmir-Slfaat, Alta-Agač, a local strain of Ukrainka [Ukrainian] and the hard semiwinter *apulicum* wheat Zarda.
Cytological analyses of the hard wheats changed into soft wheats showed that tissues of some plants had 28 and others 42 chromosomes. When the hard wheats changed into soft wheat their enzymatic processes resembled more closely those of soft wheats.

The rye grains obtained from some ears of the above mentioned Armenian wheats gave characteristic and fertile *Secale cereale* plants. In two instances the rye ears contained a single wheat grain each. These two grains, when planted, gave plants with 42 chromosomes. The other grains from the same ears grew into plants with 14 chromosomes.

1061. Poruckiĭ, Ju. V. and Muraševskiĭ, G. V.
(Physiological properties of intravarietal vegetative hybrids).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 1 : 30–33. [Russian].

In experiments at the Lenin District Seed Farm, Žitomir province, intravarietal vegetative hybridization of wheat, potato and apple has given healthier material. The physiological improvement is attributed to more water becoming available to the plants, particularly to their reproductive organs.
The intravarietal hybrids of wheat were from the varieties Ukrainka [Ukrainian] and Kahetinskaja Vetvistaja [Branching Kahetian], the stocks and scions differing only in respect of their origin. The vegetative hybrids produced better developed grains and more grain per ear than the controls for several generations.
A vegetative hybrid of the potato Early Rose was obtained by grafting two eyes from one tuber on to another tuber of the same variety but of different origin.
The intravarietal vegetative hybrid of Renet Bergamotnyĭ [Bergamotte Reinette] showed a physiological improvement of the reproductive organs of the scion.

1062. Abolina, G. I.
(The directed transformation of the spring wheat, Milturum 321, into a winter wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 3 : 33–36. [Russian].

Plants of the third successive generation of Milturum 321 to be sown in autumn, unmodified Milturum 321 not previously sown in autumn, and the winter wheat Alabasskaja were dug up at intervals during winter and early spring, and the content of water and sugars in the tillering nodes was estimated.
During the winter, the third generation of overwintered Milturum contained less water and a higher percentage of sugars than control plants of Milturum 321. Furthermore, the vernalization phase was passed and the light phase reached more quickly at the lower temperature.
With regard to the foregoing characters, plant height, length of ear, number of spikelets and grain characteristics, the modified Milturum is less like the original spring form and more like the winter wheat, Alabasskaja.

1063. Bakalov, V. V.
(The Giaginskiĭ State Varietal Field).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 5 : 26–28. [Russian].

Trials of various cereals in the Krasnodar territory are reported.
Wheat. A new winter wheat, Novoukrainka 83/4 [New Ukrainian 83/4], has been selected at Krasnodar. It outyields the initial variety, Novoukrainka 83, by 2·4 c. per ha. Skorospelka L–1 [Early L–1], and Bezostaja Škoda [Awnless Škoda], both winter wheats, are still under trial. The spring wheat Hordeiforme 27 has been made a standard.
Barley. Mass selection of the winter barley Cenader 395 [Exorbitant Price 395] has given Giaginskiĭ 395, remarkable for its productiveness, lodging resistance, large grain and low chaff content. Another new barley, Krasnodarskiĭ 1918 [Krasnodar 1918], which is 5 to 7 days earlier than Giaginskiĭ 395, has been made a standard.

1064. Bjaanes, M.
Undersøkelser i vårkveiteforedling.
(Studies in spring wheat breeding).
Forskning Forsøk Landbruk., Oslo 1951 : **2** : 84–139.

In 1936 the following four crosses were made, each including the mildew (*Erysiphe graminis*) resistant Fram I or II as one parent: Fram I x Pika, Marquis x Fram II, Sopu x Fram II and Fram I x Diamant II [Diamond II]. Individual plants were selected in the F_2 and their progeny were termed F_2 families. Resistant F_2 families were selected in F_3 and segregating generations from F_4 to F_7 of 28 F_2 families were tested in yield trials.
Marked differences were found in the different crosses and between the F_2 families within the same cross as regards grain yield and percentage, stiffness of straw, vegetation period, hectolitre weight and the Pelshenke test figure. Sopu x Fram II was superior to the other crosses in most of the characteristics of practical value, and the F_2 family 043 from that cross surpassed

the other F_2 families in yield of grain, stiffness of straw, and gluten quality.

Line selection from F_6 onwards showed that low yielding F_2 families in the preliminary trials gave lines which were mostly low yielding also, whereas the 043 F_2 family gave mostly high yielding lines. Reasons for the superiority of lines from 043 are suggested. These lines are not, however, completely resistant to some presumed new races of powdery mildew which seem to have arisen.

Tests of gluten quality and baking property suggest that the 043 F_2 family was heterozygous for gluten quality, and it also appears that in the material tested high gluten quality is not a recessive character as Pelshenke found.

The experiment further showed that all F_2 families except 043 could have well been discarded before line selection was undertaken. The selection method employed is superior to the population method since it reduces the total variation of the population in the segregating generations by means of trials of the various component F_2 families. The amount of material needed for the final selection of lines is thus considerably reduced.

1065. SCHIEMANN, E.
New results on the history of cultivated cereals.
Heredity 1951 : **5** : 305–20.

An attempt is made to connect the contributions made by the German research, using material collected from Asia between 1935 and 1939, with international work of the last decade. The discovery of a wild six-rowed form of *Hordeum agriocrithon* is reviewed, with the suggestion that two-rowed cultivated barleys arose as hybrids between the six-rowed cultivated types and Transcaucasian strains of *H. spontaneum*. Contrary to Vavilov, *H. spontaneum* and *Triticum dicoccoides* are regarded as direct ancestors of cultivated barley and wheat. The identity of the centre of diversity with the centre of origin is discussed; data concerning the six-rowed barleys of eastern Asia, *T. monococcum* in Anatolia and *T. dicoccum* in Transcaucasia agree with Vavilov's theory, but secondary centres of diversity, far from the place of origin, exist in the case of six-rowed barleys in Abyssinia and hexaploid wheats in central Asia.

Reference is made to the synthesis of *T. Spelta* as an amphidiploid of *T. dicoccoides* x *Aegilops squarrosa* (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 166); this does not account for the endemic occurrence of *T. Spelta* in the Rhine valley since the bronze age.

1066. SCHRIMPF, K.
Ein Beitrag zur Phylogenie und Systematik der Gattung *Triticum*. (**A contribution to the phylogeny and systematics of the genus *Triticum*).**
Z. Pflanzenz. 1951 : **31** : 42–71.

A review is given of the literature on the phylogenetical relationships of the wheat species, particular attention being given to the views of McFadden and Sears, based on actual genetical reconstructions of *T. Spelta*. There follows a review of the various systems of classifying the varieties within the species. Flaksberger's system for *T. aestivum* is preferred as it conforms most closely to biological and genetical standards, though it is pointed out how closely it resembles Körnicke's scheme, a purely artificial system, in many respects. Correspondences between Flaksberger's system and that of Lange-de la Camp (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 1449) are also pointed out. Many of the wheats of European countries fail to fit into either classification and further *proles* will be necessary in the Flaksberger system. Suitable *proles* to accommodate the wheats of Germany, the Alps, Italy and Spain are suggested, together with modifications to provide for material from North and South America, Australia and other continents.

1067. KIHARA, H.
(The future for investigations on wheat).
Idengaku Zasshi/Jap. J. Genet. 1947 : **22** : 43–50. [Japanese].

A comprehensive review is provided of Japanese and other investigations on genome analysis in *Triticum* and related genera.

1068. YAMASHITA, K.
(Analysis of X-ray-induced reciprocal translocations in Einkorn).
Idengaku Zasshi/Jap. J. Genet. 1947 : **22** : 34–37. [Japanese].

By intercrossing X-ray-induced reciprocal translocations of *T. aegilopoides* and *T. monococcum* involving different chromosome pairs, a series of hybrids has been obtained with up to 12–chromosome rings. The significance of these forms with reference to naturally occurring structural hybridization is discussed.

1069. MILNER, M. and GOULD, M. R.
The quantitative determination of phenol oxidase activity in wheat varieties.
Cereal Chem. 1951 : **28** : 473–78.

Marked variation in catechol oxidase activity was found among 14 different varieties analysed at the Kansas Agricultural Experiment Station.

1070. YAMADA, T. and FUZIYOSI [FUJIYOSHI], S.
(Studies on the inheritance of fasciculation and on its relation to some of the principal characters of the plant in wheat).
Idengaku Zasshi/Jap. J. Genet. 1947 : **22** : 32–33. [Japanese].

The inheritance of fasciculation was studied in the F_1–F_4 of the cross Hokuriku 13 x Saitama 27. In the F_1, the progeny were intermediate between the parents in respect of fasciculation, while in later generations segregation was complex, suggesting that fasciculation is determined by the interaction of several incompletely dominant genes. Notes are added on the correlations between fasciculation and other plant characters.

1071. DANJŠIN, T. E.
(Methods of rearing hybrid élite seed).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 3 : 36–42. [Russian].

Vigorous hybrids having varied characters are produced by fertilizing maternal plants with pollen from several widely different sources. The article contains tables showing the results of pollinating Vjatka and Oruka ryes, and Lutescens 116, Diamant and other winter and spring wheats.
To overcome the difficulty of setting seed, artificial pollination is recommended whenever necessary.
The method of vegetative hybridization proposed consists in grafting an embryo of one variety on to the endosperm of another, and letting the combination root on sterilized sand for several days before transferring it to soil. The complexity of characters implanted in the embryo may be further intensified by growing the embryo on a succession of endosperms from several different varieties of seed.

1072. MEDVEDEVA, G. B. and BAZAVLUK, V. JU.
(Some principles in the segregation of hybrids between branching wheat and soft winter wheats).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 132–46. [Russian].

The results of a morphological and cytological study of the F_1 and F_2 hybrids between various soft winter wheats and Kahetinskaja Vetvistaja [Kahetian Branching] wheat, *Triticum turgidum*, are discussed. The F_1 plants described were obtained from Milturum 120, Alborubrum 2671, Albidum 26805 and Lutescens 329, on the one hand, and Kahetinskaja Vetvistaja, on the other.
The F_2 studied comprised direct and reciprocal crosses between the following varieties and Kahetinskaja Vetvistaja: Odessa 3, Odessa 12, Erythrospermum 599 and 1160, Albidum 26805, Milturum 120, Alborubrum 2671, Hostianum 237, Ferrugineum 2411, Ukrainka [Ukrainian], Sandomirka [Sandomir] and Kuusika.
The hybrids were grown in varied environments to determine the effect of external conditions upon segregation in respect of hard and soft wheat types and branching and nonbranching ear types.
The highest proportion (55%) of soft wheats was obtained when the seed was vernalized and planted upon well prepared, fertile and moist soil. The maximum number of forms with branching ears (29%) was produced on the same soil, but vernalization reduced the percentage. The hard wheats included more plants with the branching habit (53%) than the soft wheats.
The fertility of the F_2 hybrids was directly related to external conditions, progenies of the soft wheats giving smaller percentages of fertile hybrids than those of the hard wheats. Branching wheats were more fertile than nonbranching when grown upon good soil, but their fertility dropped below the level of the nonbranching forms when the soil lacked nutrients or moisture.
Chromosome counts gave 35 chromosomes in the F_1 and a range in the F_2, including hard wheats with 42 and soft wheats with 28 chromosomes.

1073. FORLANI, R.
I frumenti ramificati. **(The branched wheats).**
Humus, Milano, 1951 : No. 10 : 6–8.

This account of the way in which the so-called "miracle wheats" have been exploited from time to time, in the popular press of various countries and among tourists, also contains information on the botanical identity and morphology of these wheats (cf. *Plant Breeding* Abstracts, Vol. XX, Abst. 868).
The effect of crossing the tetraploid branched type with a hexaploid is also mentioned, special reference being made to the strange shapes and colours of the resulting ears.
The branched wheats may provide new material for breeders.

1074. Kornilov, A. A.
(Increasing the grain size in breeding work with wheat).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 1 : 24–29. [Russian].

Training early generations of wheat hybrids for large size of grain at the Karaganda Agricultural Research Station is reported. The methods included dressing with phosphates and avoiding the use of nitrogenous fertilizers during and after flowering and removal of some spikelets from the proximal and distal ends of the ear to stimulate development of the grains in the centres of the ear. The latter method is recommended when bad weather conditions check grain formation. Reference is made to an F_3 hybrid from Ak-Bidaĭ [White wheat] x *Triticum dicoccum* x Ak-Bidaĭ 630 which produced large grains after these treatments.

1075. Yamasaki, Y.
(The growth of embryos transplanted between different species and genera of cereal crops).
Idengaku Zasshi/Jap. J. Genet. 1947 : **22** : 33–34. [Japanese].

Successful growth has resulted from grafting embryos of *Triticum vulgare* and *T. dicoccum* on the endosperms of *T. vulgare*, *T. dicoccum*, Einkorn and naked barley, but not on rice endosperm.

1076. Kalimičenko, V. O.
(A method of estimating the baking qualities of wheat during the early stages of breeding).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 3 : 43–48. [Russian].

The baking qualities of some wheats, especially hard wheats, are sometimes underestimated if the dough ferments in water instead of air. Lutescens 62, for example, a variety having white, soft sticky flour, appears to presage better qualities than KP 754; but, according to the evidence of fermentation in air, the latter, though yielding a darker, more friable flour containing finer particles, appears to form the better dough.
The author has accordingly devised an apparatus for estimating the amount of swelling and the volume of gas formed by dough fermenting inside a vessel immersed in water kept at a temperature of 25° to 25·5° C for 150 minutes.

1077. Kizima, P. N.
(Investigating the aminoacid content in the protein of some winter wheat varieties).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 5 : 8–11. [Russian].

The results of grain and flour analyses of Ukrainka [Ukrainian], Zarja [Dawn], Novoukrainka 83 [New Ukrainian 83], Pervenec [First born] and Krasnodarka [Krasnodar] are reported.

1078. Samolevskiĭ, I. Ja.
(Improving the quality of wheat varieties).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 12–15. [Russian].

Investigations have shown that a proportion of the grain of Lesostepka 74, Ukrainka and Lutescens 17 has superior baking qualities; selections made from these grains have bred true for improved quality. The effects of position of the grain in the ear and soil fertilization on baking quality are discussed.

1079. Salmon, S. C.
Analysis of variance and long-time variety tests of wheat.
Agron. J. 1951 : **43** : 562–70.

Data obtained from varietal trials in the Great Plains over a period of years emphasize the importance of year x variety interaction and indicate some of the common sources of the error variance component.

1080. *Šen, B. L.
(Cultivation and crop varieties).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 59–62. [Russian].

Relative adaptability of wheat varieties to specific cultural conditions is discussed with reference to Lutescens 17, Erythrospermum 15 and Ukrainka in the Kiev province.

1081. Aitken, T. R., Fisher, M. H. and Anderson, J. A.
Quality of Australian wheat varieties grown in Canada.
Sci. Agric. 1951 : **31** : 439–53.

Comparative data on the yielding ability, date of maturity, reaction to leaf rust and milling and baking qualities of eight Australian varieties and two Canadian standards, Marquis and

* An extended summary of this paper is on file at the Bureau.

Thatcher, reveal many characteristics desirable in the Canadian breeding programme. Milling and baking qualities of Gabo and Gular are already being exploited in crosses with Canadian wheats.

1082. Vinogradova, E. I.
(Changes in a variety of winter wheat sown with immature seed).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 33–35. [Russian].

In experiments at the Leningrad State Breeding Station the inheritance of a winter wheat Krasnyĭ Gibrid [Red Hybrid] was shattered when immature seed was sown. The variety has been bred from a *lutescens* variety DS1769 and a *ferrugineum* variety DS2444/16 and has previously given uniform progenies for several generations. Krasnyĭ Gibrid has a red ear and short straw and is a wheat of the *milturum* type. The changes involved lowered resistance to cold and segregation of different forms including tall *milturum* plants with a changed type of ear, tall *lutescens* forms resembling DS1769 and plants with pubescent red awnless ears, none of which normally occurred in the parental lines of DS1769 and DS2444/16. The percentage of new forms developed in the first year was 2% but increased appreciably in the second year.

1083. Jonard, P. and Koller, J.
Les facteurs de la productivité chez le blé. Résultats obtenus en 1948 et 1949. **(The factors of productivity in wheat. Results obtained in 1948 and 1949).**
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Sér. B : 256–76.

This study is still in progress but some tentative conclusions are here put forward on the basis of two years' work on the relative importance of the following components of productivity in different varieties of wheat: number of ears per m.^{2}; weight and number of grains per ear; number of fertile spikelets; and 1000 corn weight. Apparently similar yields in different varieties may be conditioned by different components.

1084. Cedik-Tomaševič, Z. F.
(Intraspecific relations of cereal plants).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 1 : 14–23. [Russian].

In experiments at Gorki Leninskie the spring wheats Moskovka [Moscow] and Lutescens 62 did not compete with each other when grown in a mixed field. Similarly, no competition occurred between the winter wheats Durable and Kuusiku.

1085. Bolotova, N. N.
(Winter wheats on the varietal field plots in the Molotov province).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 52–57. [Russian].

Reference is made to two varieties having different types of hardiness. Erythrospermum 529 shows a high degree of resistance to the effects of cold and thaw under the snow. Uljjanovka [Uljjanov] on the other hand, is less susceptible to the effects of low temperatures, while showing a lower degree of resistance to the effects of cold and thaw under the snow. In the trials both varieties outyielded the standard rye-wheat hybrid 46/131.

1086. Belozorov, A. T.
(Spring and winter wheats in Siberia).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 3–11. [Russian].

Application of various agrobiological methods to cultivation of wheat in Siberia, including the training of spring wheats for hardiness, is discussed. Mention is made of a spring wheat, Milturum 321, which has been changed by this method into a productive and very hardy winter wheat Omskaja [Omsk] at the Siberian Institute of Grain Farming, Omsk.
Late autumn sowing upon stubble is a method recommended for improvement of bunt resistance in Caesium 111, an old, productive mid-season variety highly susceptible to the disease. Reference is made to breeding work with branching wheat at the Siberian Scientific Research Institute of Grain Farming. The work has involved individual and family selection and hybridization between selected branching wheat forms and the Siberian large grained soft wheats. Some promising material has been obtained, the F_2 of which yielded 37·3 c. per ha.

1087. Åkerman, Å.
Undersökningar rörande vinterhärdigheten hos svenska lantveten. **(Investigations concerning winter hardiness in Swedish land wheats).**
Forskning Forsøk Landbruk., Oslo 1951 : **2** : 6–17.

Swedish research on the above subject is reviewed from 1890 to 1947 with special reference to the building up of a representative collection of indigenous wheats and to the

occurrence of winter hardiness among them and their possible value in the attempt to combine hardiness with good yield. Extensive tables show the performance of large numbers of Swedish and foreign varieties and strains in winter hardiness tests at the Svalöf and Ultuna research stations.
It seems that only the Norwegian wheat Enger, the Estonian wheats Kuusiku and Luunja and Minhardi from Minnesota are somewhat hardier than the old Central Swedish wheat Sammet [Velvet], but some Finnish and Russian strains might be equally hardy.

1088. Hess, N. and Mrkos, G.
Beobachtungen über Standfestigkeit bei Winterweizen. **(Observations on standing capacity in winter wheat).**
Z. Pflanzenz. 1951 : **30** : 414–17.
Seedlings of a number of varieties were grown in covered dishes in a warm, moist greenhouse and daily observations made on the number of seedlings that bent over. Clear varietal differences were observed, the greatest standing capacity being noted in the variety Hauters II. The results corresponded on the whole to the behaviour of the varieties observed in the field.

1089. Lovčikov, I. S.
(The spring wheat Arnautka Nemerčanskaja).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 5 : 70–71. [Russian].
The hard spring wheat Arnautka Nemerčanskaja, originally bred from a local *hordeiforme* variety at the Nemerčansk Breeding Station, has been made a standard in several provinces of the Ukrainian woody steppe zone. In the trials it has outyielded the hard wheat Melanopus 69 and the soft wheat Lutescens 62. It shows resistance to lodging and shedding and is suitable for combine harvesting. The grain is vitreous and its baking and milling properties are good. The 1000 grain weight is 33 to 43 grm. The variety is susceptible to loose smut.

1090. Bever, W. M.
Differential lethal effect of hot-water treatment on the loose smut mycelium in nine varieties of winter wheat.
Phytopathology 1951 : **41** : 875–79.
Mycelia of *Ustilago Tritici* within wheat grains of nine varieties responded differently to immersion in hot water following four hours' presoaking in cold water. The fungus in the variety Brill was killed at 138° F whereas it survived at 147° F in Clarkan. Various intermediate temperatures were lethal in the other wheats. Correlation was found between the amount of water absorbed by different varieties and the temperature required to kill the pathogen; Brill absorbed most water and Clarkan the least.
The fungus was eliminated from all nine varieties by presoaking for six hours and exposure to 130° F.

1091. Holton, C. S. and Jackson, T. L.
Varietal reaction to dwarf bunt and flag smut, and the occurrence of both in the same wheat plant.
Phytopathology 1951 : **41** : 1035–37.
Data on the bunt and smut resistance of 14 varieties of winter wheat grown in Washington show that Rex (CI 11689) is the only variety with field resistance to both pathogens. Although ear emergence is generally suppressed in plants infected with flag smut, several smutted plants produced ears which were infested with dwarf bunt. It is suggested that bunt infection restricts the ear-suppressing effect of flag smut.

1092. Gassner, G.
Jahresbericht der Biologischen Bundesanstalt für Land- und Forstwirtschaft in Braunschweig 1950. **(Annual Report of the Federal Biological Institute for Agriculture and Forestry in Brunswick 1950).**
1951 : Pp. 48.
Wheat. A correlation was established between the rate of development of early maturing wheat varieties and their cold requirements.
A new method of determining the osmotic values of wheat seedlings was elaborated; no correlation between osmotic value and frost resistance was observed.
Observations on the biotypes of *Puccinia triticina* in western Germany were resumed. Two further biotypes of *P. glumarum* have been detected in Germany, one of them being a new form.
Potato. Grafting tests to determine which potato varieties gave a necrotic reaction were made with nine strains of virus X. Two distinct types of virus X were detected; no potato variety tested gave a necrotic reaction to strain Ro 7.
The degree of virus infection of different varieties was not correlated with the number of aphids present upon them but proved to be a varietal characteristic. The most resistant varieties were Aquila, Heida and Vera.

Tests of reaction to *Bacterium phytophthorum* have shown the varieties Biene, Heida, Immertreu [Ever True], Maritta, Heimkehr [Homecoming] and Ronda to be highly resistant.

Oil crops. Varietal differences in resistance to mosaic virus were observed in swedes, Vogesa being the most resistant.

1093. VALLEGA, J.
Consideraciones sobre la raza 15 B de *Puccinia graminis tritici*. (**Considerations on race 15 B of *P. graminis tritici*).**
Inform. Invest. Agric. (IDIA), B. Aires 1951 : No. 45 : 14–17.

South American material of race 15 is capable of attacking Rival, *Triticum Timopheevi* and certain other varieties previously considered resistant, and is ascribed to race 15 B, which has also become more prevalent recently in the USA. Tests in Argentina have shown Mentana and Rieti and some of their descendants to be resistant to 15 B, whereas most of the varieties resistant to race 15 itself, such as McMurachy, Timstein and the *Aegilops* hybrids, were susceptible. The most promising sources of resistance to the Argentine race so far seem to be Kenya 58 (CI 12471), Kenya 117 A (CI 12568), Egypt NA 101 (CI 12100), Egypt N 95, Kenya Governor, Kenya Standard, lines 24 G and F, certain hybrids of Kenya made in Mexico and the USA, and, in *T. durum*, Beladi 116 and various forms of Tremez. A large number of other varieties are being tested in cooperation with the University of Minnesota.

1094. THORPE, H. C.
A note on the release of some new cereal varieties—III.
E. Afr. Agric. J. 1951 : **17** : 88–89.

Notes are given on the new wheats, 306H, 337BE2F2, 338AA1A2, 184P2A1A, 350AD9C2 and 341F2D1, developed at Njoro, Kenya, and recently released to farmers. All varieties possess resistance to eight strains of *Puccinia graminis* var. *Tritici*, but only 360H and 184P2A1A show seedling resistance to a ninth strain newly isolated in East Africa.

Variety 360H was selected from 294M7C6C x 184P2A1E. It is beardless, white-chaffed, white-grained, resistant to leaf rust and resistant to yellow rust up to 8500 ft. It has medium maturity and is suited to all areas from 6000 to 8500 ft. in Kenya, and above 5500 ft. in the Northern Province of Tanganyika, having a growing season of 5–6 months.

Developed from the cross Reliance x 286B6Y (L), 184P2A1a is bearded, white-chaffed, red-grained, resistant to leaf rust and resistant to yellow rust up to 6500 ft. The straw is tall and weak, but the grain is of good baking quality. It is recommended for all areas of Kenya with an altitude of 5000 to 6500 ft. and a growing season of 5 months.

The four other varieties are beardless, white-grained and white-chaffed. Variety 338AA1A2 (192Q2AL x Australian 27–2215) has grain of good baking quality and is adapted to areas from 5000 to 7000 ft. in Kenya. The varieties 337BE2F2 (223F1A3 x 291J1B1), 350AD9C2 (223F1A3 x 294M7C8) and 341F2D1 (27915F2 x Eureka G2503) can be grown in Kenya at altitudes ranging from 7500 to 9000 ft. having a growing season of 5–6 months. Although these four varieties are susceptible to the new strain of black stem rust, it is hoped that they may replace Equator at higher altitudes.

1095. DE URRIES, M. J. and CAÑAMÁS, R.
Reacción de una colección de trigos híbridos del Centro de Cerealicultura, a las razas números 14 y 21, de "Puccinia graminis tritici." (**Reaction to races 14 and 21 of *P. graminis tritici* of a collection of hybrid wheats from the Centre for Cereal Culture**).
Bol. Inst. Nac. Invest. Agron., Madr. 1951 : **11** : No. 24 : 29–47.

Tabular data are given showing the reaction of a number of hybrids to artificial infection with the two main Spanish biotypes. Resistance to race 21 was found only in some hybrids of H 44, and of Aragón 104–178, whereas a score of hybrids were resistant to race 14, the most resistant of all being hybrid 205–58–43 (Gluyas Early x Extremo Sur Argelino [Extreme South Argelino]) x Pusa 4. Crosses are now being made with the object of combining resistance to the two races, since none of the hybrids tested was resistant to both.

Some of the hybrids have shown the existence of subraces within races 14 and 21 in Spain.

1096. **New wheat "Ponca".**
Sth. Seedsman 1951 : **14** : No. 12 : p. 56.

The release of Ponca (CI 12128), a new hard red winter wheat developed by the Oklahoma and Kansas Agricultural Experiment Stations, is reported. Ponca resembles Pawnee in many respects, but has superior resistance to leaf rust and Hessian fly, and has outyielded Pawnee by 4·4 bushels in eastern Oklahoma.

1097. Ahmed Afifi
Production of rust resistant *vulgare* wheats by backcrossing 1.
Bull. Roy. Agric. Soc. Egypt Tech. Sect. 1951 : No. 35 : Pp. 25.

Resistance to *Puccinia graminis* var. *Tritici* is being sought in Egypt among all possible combinations of genotypes derived from four varieties of *Triticum vulgare*, namely, Mukhtar, Giza 139, Tusson and Giza 4 x Maarad. Data are presented on the relative susceptibility of three back cross generations involving different genotypes; those lines in which Mukhtar and Giza 139 were recurrent parents have so far shown most resistance. Further back-crossing is in progress. Selections made in 1950 from the F_1, B_1, B_2 and B_3 grown under epidemic field conditions are undergoing additional field and greenhouse trials.

1098. Dunbabin, T.
New Australian wheat variety.
New Commonwealth 1951 : **22** : p. 412.

A new stem rust resistant wheat, temporarily known as BKP, has been developed at Glen Innes, NSW, from (Kenya x Baringa) x Pusa III. It combines the resistance of Kenya to stem rust, the high yielding capacity of Baringa and the desirable baking qualities of Pusa III. BKP has fine quality straw and threshes easily.

1099. Hassebrauk, K.
Die Einwirkung neuzeitlicher Kontaktinsektizide auf die Braunrostanfälligkeit von Weizenkeimpflanzen. (**The effect of modern contact insecticides on the brown rust resistance of wheat seedlings**).
NachrBl. dtsch. PflSchDienst. 1951 : **3** : 161–64.

Experiments were made with wheat varieties of known reaction to the biotypes of *Puccinia triticina*. Seedlings were infected with the fungus and afterwards sprayed with insecticide. DDT increased the susceptibility of most varieties, though in varying degrees; some varieties were unchanged. With γ-isomers of hexachlorocyclohexane some varieties showed reduced and some increased resistance; DKH increased resistance in most varieties, Synthal reduced it in all varieties but Abundance Gold Coin, where it was increased. E 605 raised the resistance markedly in most, but not all, varieties.

1100. *Ševčenko, F. P.
(**The inheritance of resistance to diseases in spring wheat varieties**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1961 : No. 4 : 7–11. [Russian].

Embryos of Caesium 111 and Milturum 321, with varying degrees of susceptibility to *Ustilago Tritici*, *Tilletia caries*, *Puccinia triticina* and *Fusarium* root rot, have incorporated the disease reactions of Hordeiforme 10, Apex and Emmer after being grafted on to endosperms of these varieties; the effect of a single grafting was evident in succeeding generations.

1101. Hsia, Y.-T. and Christensen, J. J.
Effect of 2,4–D on seedling blight of wheat caused by *Helminthosporium sativum*.
Phytopathology 1951 : **41** : 1011–20.

The pathogenicity of *H. sativum* on Mida, normally a moderately resistant variety, was increased by spraying plots at St. Paul, Minn., with 2,4–D. Investigations have shown that 2,4–D predisposes Mida to attack by the fungus. Although colonial variants were noted in *H. sativum* on a 2,4–D medium, none was more pathogenic than the original culture.

1102. Pfeiffer, R.
Untersuchungen zum Weizenhalmfliegenproblem in den Alpenländern Österreichs. (**Investigations on the problem of the gout fly in the Austrian alps.**)
Veröff. Bundesanst. alp. Landw. Admont 1951 : No. 5 : 66–95.

Observations on 25 varieties of winter wheat in the Austrian alps showed that those with the earliest ear emergence were least attacked by *Chlorops taeniopus*, the best variety in this respect being Hohenauer with 3·8% attack, and the worst Plantahofer with 76%. No varietal differences other than those associated with earliness were observed; most awned varieties had early ear emergence and hence were less attacked than the awnless forms, whereas spring wheats eared later and were more heavily attacked than winter wheats.
The earliest winter wheat varieties such as Hohenauer and Austro-Bankut are inferior in winter hardiness and strength of straw, but by adding these qualities to them by breeding the gout fly problem will be virtually solved. Such a variety has now been produced at the Admont

* An extended summary of this paper is on file at the Bureau.

station by selection from a mixed hybrid population that had been exposed for a number of years to the rigorous alpine climate.

1103. Torpe, N. V.
Resultat från försöken med höstvete vid Sveriges Utsädesförenings Värmlandsfilial 1922–1950. (**Results of trials with autumn wheat at the Värmland Branch Station of the Swedish Seed Association 1922-50**).
Sverig. Utsädesfören. Tidskr. 1951 : **61** : 207–23.

This detailed survey contains information on Swedish autumn wheat trials as regards yield of grain and straw, overwintering capacity, strength of straw, time of ripening, hectolitre weight and thousand corn weight. The accompanying tables include information on the origin and performance of Vrm 01251 and 01252, selections made from Sol II [Sun II] x Svea II to combine the hardiness of Svea with greater strength of straw.

1104. Monaci, M.
Note di granicoltura Chianina. (**Notes on wheat cultivation in the Chiana valley**).
Agricoltura Tosc. 1951 : **6** : 404–06.

Extensive trials of many varieties of wheat to find out which were best adapted to the Val di Chiana, Italy, are recorded. On the basis of the records for yield of grain and straw, 1000 corn weight and resistance to late frosts, lodging and rusts, the four best wheats for the region were placed in the following order: (1) Freccia [Arrow] and (2) Mara, both bred by Michahelles from Aquila (Gentil rosso 276 x Inallettabile 38 x Damiano Chiesa) crossed by Autonomia (Frassineto 405 x Mentana), (3) Autonomia B, and (4) Torre Nuova (S. Maria x Virgilio), another of Michahelles' wheats.

BUCKWHEAT

1105. Geroev, M. Ja.
(**The new buckwheat variety Gornolesnaja**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 1 : 79–80. [Russian].

A new productive, early and hardy buckwheat, Gornolesnaja [Woody Mountain], has been selected from a local Baškirian variety at the Duvanskiĭ State Varietal Field Station. It has a growth period of 68 to 74 days, or even shorter. It is resistant to lodging and to the effects of spring and frosts. The straw is 73 to 100 cm. tall and the 1000 grain weight 20 to 22 grm. The husk content is low.

OATS

1106. Åkerman, Å.
Über die Züchtung sehr frühreifer und ertragreicher Schwarzhafersorten für Nordschweden. (**Breeding very early and high yielding black oat varieties for northern Sweden**).
Z. Pflanzenz. 1951 : **30** : 350–54.

The experience of 30 years at Svalöf has led the author to the same conclusion as that reached by Nilsson-Ehle before him, that in working with genetically pure material no amount of selection will increase the earliness of a variety unless an occasional early maturing mutant appears. Selection in hybrid populations has led to definite improvements and the work in this respect with oats during the last 50 years is here described. A cross of Ligowo x 0668 (an early black oat from a land variety from northern Norway) gave rise to Orion II, ripening as early as Mesdag but yielding 15% more grain and showing superiority also in standing capacity and grain quality. A further cross of Orion II with Sv 25/356, a primitive oat from the extreme north of Sweden, gave rise to the variety Same which in northern Sweden has exceeded Orion II by 9% in grain yield, though its straw yield is 10% less. In southern Sweden on the other hand Same shows no superiority over Orion II; there a newer variety Å 01600, from (Orion II x Golden Rain) x Orion II, exceeds Same by 16·7% in grain yield though it is inferior to Same in the extreme north.

1107. Sword, J.
The development of oats in Scotland. The march of improvement by selection.
Milling 1949 : **112** : 468, 470.

An historical account of oat growing in Scotland traces the development of casual and systematic selection techniques and refers to recent progress in varietal improvement at the Corstorphine breeding station.

1108. **Notes from Auchincruive—IV.**
Scot. Agric. 1951–52 : **31** : 171–74.

Varietal trials of oats are reported. For three years Yielder seed obtained from western Scotland has given significantly higher grain and straw yields than seed from northern and eastern areas. Tests are in progress to determine whether the seed of western origin constitutes a strain within the variety.

1109. Joshi, A. B.
Cytogenetics of hexaploid oats, with reference to the occurrence of off-types in new varieties, and the origin of *Avena sativa* L.
Abstr. Diss. Univ. Camb. 1949–50 (1951) : 22–23.

A population of Picton oats (Argentine x Grey Winter) contained a number of morphological offtypes, with normal meioses, and plants with 47–100% cells showing meiotic irregularities such as multivalents, univalents and inversion bridges. Other hybrids obtained by crossing a spring variety, Victory or Argentine, with a winter variety, Grey Winter or Black Winter, also showed higher percentage frequencies of irregular pollen mother cells (14–31%) than the spring x spring (3·5%) or winter x winter (1·6%) hybrids.

An investigation of meiosis in the F_2 of Argentine x Grey Winter indicated that the differentiation of spring and winter oats depends on 2 pairs of partially homologous chromosomes. There was, however, some evidence of factors other than chromosomal homologies affecting chromosome pairing in the hybrids.

F_1 interspecific hybrids between *A. sativa*, *A. sterilis* and *A. fatua* had only 6–13% irregular pollen mother cells, whereas 59–88% of the cells in F_1 hybrids of *A. byzantina* crossed with *A. sterilis*, *A. sativa* and *A. fatua* showed irregular meiosis.

1110. Coffman, F. A. and Stevens, H.
Relation of temperature and time of day of pollination to seed set in oat crossing.
Agron. J. 1951 : **43** : 498–99.

On very warm days at Aberdeen, Idaho, higher seed sets were obtained when pollination was postponed until 4–7.30 p.m., than when it was carried out between 2 and 5 p.m., the period found to be the most favourable on less warm days (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 483).

1111. Krutihovskiĭ, V. K.
(Naked oats and some special agricultural methods that they require).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 1 : 69–70. [Russian].

Trials of oats conducted in the Moscow province included a naked oat variety Mestnyĭ Golozernyĭ [Local Naked] showing resistance to lodging and shedding. It was selected in 1945, and produced in 1949 26·6 c. grain and 56·5 c. straw per ha.; the 1000 grain weight was 27·6 grm.

1112. Frey, K. J.
The relation between alcohol-soluble and total nitrogen contents of oats.
Cereal Chem. 1951 : **28** : 506–09.

Analyses of total nitrogen and alcohol soluble nitrogen in 19 varieties grown at East Lansing, Mich., showed that the alcohol soluble nitrogen remains a constant proportion (18%) of the total nitrogen content in all varieties. Thus the methods of selection used by Frey (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2639) to improve the protein content of maize cannot be applied to oats as the nutritive value of total protein does not change.

1113. Kudrjavceva, N.
(A new variety of oat).
Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 9 : p. 26. [Russian].

A new late maturing variety, Orel [Eagle], bred at the USSR Institute of Plant Industry, outyielded several standard varieties in several provinces of Russia and Siberia.

Orel produces good quality grain with a lower chaff content than Victory or Dippe. The 1000 grain weight is 33 to 35 grm. The variety shows resistance to drought, lodging, shedding, pests and fungous diseases.

1114. **Shasta, new spring oat, released by Oregon Experiment Station.**
Crops and Soils 1951 : **4** : No. 1 : p. 29.

The smut resistance of Markton and the high yielding ability of Victory are combined in a new tall-stalked spring oat, Shasta, developed from Markton x Victory at Oregon, with the cooperation of the US Department of Agriculture. Shasta is a late maturing variety which outyields Markton, Kanota and Victory.

1115. *Osipov, A. E.
(Experiments of selecting oats immune to loose smut).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 3 : 75–77. [Russian].

Data are presented on the relative smut resistance of Victory and Sovetskiĭ seedlings developed from seed formed in panicles showing varied reaction to *Ustilago Avenae*. A higher proportion of resistant seedlings was obtained from healthy seed selected from severely infected plants than from seed of uninfected panicles or entirely healthy plants.

* An extended summary of this paper is on file at the Bureau.

1116. Rosen, H. R. and Murphy, H. C.
Race 55 or 101 of crown rust of oats which attacks Victoria and Bond derivatives.
Plant Dis. Reporter 1951 : **35** : 370–71. (Mimeographed).

The new race 101 recently discovered in Arkansas resembles race 55 previously found in Argentina (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1796). Varieties hitherto used for the identification of crown rust races are discussed with regard to their reactions to race 101; a new set of differentials is tentatively proposed as a substitute for the older set.

1117. Vallega, J.
Características de la raza fisiológica 45 de "*Puccinia coronata avenae*" aislada en la Argentina. (**Characteristics of physiological race 45 of *P. coronata avenae* isolated in Argentina**).
Rev. Invest. Agríc. B. Aires 1951 : **4** : 337–40.

Samples of race 45 from Argentina attack Landhafer CI 3422, Trispernia CI 4009 and certain other oat varieties classed as resistant to race 45 in the USA; Victoria remains the only cultivated oat variety resistant to the Argentine form.

1118. Rosen, H. R.
Arkwin leads all.
Sth. Seedsman 1951 : **14** : No. 10 : 21, 69.

Arkwin oats, developed at the Arkansas Agricultural Experiment Station from Tennessee 1922 x Bond-Iogold, combines exceptional winter hardiness with resistance to smut, *Helminthosporium* blight, red spot mosaic, and all common races of crown rust, including race 45.

1119. Pfeiffer, R.
Ein Beitrag zur Frage der Vererbung der Schwarzrostresistenz des Hafers. (**A contribution to the question of the inheritance of black rust resistance in oats**).
Veröff. Bundesanst. alp. Landw. Admont 1951 : No. 5 : 60–65.

Some of Stakman's differential hosts which had proved most resistant in the Austrian alps were crossed with the best local Austrian varieties. The F_1 was resistant in most crosses. In five out of six F_2 families from three different crosses, 3 : 1 ratios for resistant : susceptible were established. The other progeny showed significant deviations from a monofactorial relationship, which are thought to be ascribable to cytoplasmic effects.
The progenies of 15 field-resistant F_2 plants were studied in the F_3; 3 of them were homozygous for resistance, the other 9 segregated. Homozygous F_4 families proved fully resistant when tested by artificial seedling infection in the greenhouse, though the ratios in segregating F_3 families were less clear for greenhouse infection than when tested in the field.

1120. Jones, P. J.
Oat variety trials.
Scot. Agric. 1951–52 : **31** : 132–34.

Analyses of straw length, grain yield, date of maturity and lodging resistance of Sun II, Minor and Yielder grown at 23 widely scattered centres in southwestern Scotland support results obtained at Auchincruive during the period 1947–1950 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2273 and Vol. XXI, Abst. 1799). Although Yielder matures early and is locally popular, Minor possesses greater lodging resistance, and both Sun II and Minor outyield the older variety.

RYE

1121. Nürnberg-Krüger, U.
Über die Auswirkung des Plasmas auf Leistungsmerkmale beim Roggen. (**On the effect of the cytoplasm on yield characters in rye**).
Züchter 1951 : **21** : 232–40.

A study of reciprocal crosses made with pairs (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 79) of Petkus rye plants showed that: (1) reciprocal differences affecting length of straw, tillering and number of grains per ear often occur; and (2) if planted in different soils, élite lines from pair crosses left to set seed under conditions of open pollination may show marked variability, due to genotypic changes and to the changed environment.
It was also found that replacement of unfavourable by favourable conditions might even result in a deterioration in yield being counteracted; and in some cases, with a change of environment, reciprocal differences might even vanish completely.
Some evidence against Heribert Nilsson's theory of inbreeding was found in the course of the above study.
Breeders are recommended to cross their material both ways and to test the performance of the hybrids in different environments.

1122. Bogomolov, A. M.
(Improving the inheritance of Benjakonskaja rye seed).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 63–65. [Russian].

Relative merits of different methods used to improve Benjakonskaja rye are discussed. The greatest increases in 1000 grain weight, total grain yield, seed size and flintiness were obtained by cross-pollinating and sowing large seeds.

1123. Mori, T.
(On extra chromosomes in rye).
Idengaku Zasshi/Jap. J. Genet. 1947 : **22** : p. 19. [Japanese].

During the course of a discussion on the behaviour of supplementary chromosomes at meiosis in rye, the author suggests that the lagging of these chromosomes observed at meiotic metaphase is connected with the abnormal condensation characterizing them at early prophase.

1124. Löwenstein, J. zu
Über die Befruchtungsverhältnisse zwischen diploidem und tetraploidem Roggen. **(The fertility relationships between diploid and tetraploid rye).**
Z. Pflanzenz. 1951 : **31** : 104–33.

Reciprocal crosses between tetraploid and diploid plants of Petkus rye gave much reduced sets of grain as compared with pollinations between plants of equal chromosome number. No significant difference was noted between the reciprocals. The number of viable grains produced did not exceed 1% and the risk of actual genetical mixture between the two forms, even if grown in close proximity, is extremely low. Pollinations with a mixture of haploid and diploid pollen showed that fertilization was effected mainly by the haploid pollen, so that diploid rye gave a set of 69·7% and tetraploid only 26·4%. Even when the haploid pollen was applied 30 minutes or 1 hour after the diploid pollen it competed with it favourably in $2n$ styles, and also, though to a lesser degree, in $4n$ styles.

Artificial self pollination gave no greater set of seed in tetraploid than in ordinary diploid rye. The development of the embryo and endosperm in $2n$ x $2n$, $4n$ x $4n$ and $2n$ x $4n$ crosses showed that fertilization occurred equally frequently in all, growth in the hybrids being arrested at varying stages after fertilization. The antipodal cells are not absorbed so readily in the hybrids as in the normally pollinated plants and it seems that the sterility is due to a physiological unbalance between the antipodal, maternal, embryo and endosperm tissues, leading to defective endosperm development.

Experiments in the open in which tetraploid rye was planted in alternate rows with diploid rye at a spacing of 20 cm. between the rows confirmed the results with the pollen mixtures; the seed set in the diploid rows varied from 47 to 63% and in the tetraploid rows was only 22–27%. In a 6 m. x 6 m. plot of diploid rye surrounded by tetraploid rye, the seed set was 95·1% of the normal for diploid rye (taken as 86% of all flowers) in the centre and fell to 74% of the normal at the periphery. In the surrounding tetraploid plot the set was only 52·1% of the normal (taken as 72% of all flowers) at the point of juxtaposition, rising to normal at distances of 5 m. or so, according to the direction of the prevailing wind. In a further experiment with alternating 14 m. wide plots of $2n$ and $4n$ rye the $2n$ plots suffered no significant reduction in set, and the $4n$ plots had sets varying from 35% at the margins to 60% in the centre. Corresponding differences were observed in the yields of grain and it is concluded that a belt of over 14 m. of the same variety is necessary to protect tetraploid rye from reduction of yield by pollen of different chromosome number, whereas a few metres suffice for diploid rye. A small plot of tetraploid rye can suffer reductions in yield even if grown at a distance of several hundred metres from large plots of diploid rye.

Examination of ears with reduced sets showed that the defective spikelets were mostly not empty but contained abortive grains, which were consistently larger in the diploid ears than in the tetraploid.

1125. Bremer-Reinders, D. E.
Veredelingsonderzoek van tetraploide rogge. **(Breeding research on tetraploid rye).**
Meded. N.A.K. 1950 : **7** (13) : Pp. 3.

This address at a meeting on Rye Breeders' Day held at Roermond, Holland, in March 1951 covers the same ground as the paper reviewed in Abst. 1126.

1126. Bremer-Reinders, D. E.
Nieuwe perspectieven voor de roggeveredeling. **(New prospects for rye breeding).**
Bakkerij-Wetenschap 1950 : **3** : 71–75.

The colchicine technique, here described, has been used in Holland to obtain tetraploid rye and in 1949 about 1900 kg. of seed was available and a comparative yield trial was carried out. The tetraploid has yielded somewhat more than

the diploid and milling and baking tests are to be made with some of the grain, while the rest will be used for further selection work within the original strains and for hybridization with tetraploids of other varieties more recently obtained.

1127. Schildt, R. and Åkerberg, E.
Studier över tetraploid och diploid råg vid Ultunafilialen 1949. (**Studies of tetraploid and diploid rye at the Ultuna Branch Station in 1949**).
Sverig. Utsädesfören. Tidskr. 1951 : **61** : 254–68.

Yield tests, determining the length of straw, number of fertile tillers per plant and of florets per ear and the percentage of florets with well developed grain, were carried out with a limited amount of diploid and tetraploid rye.
The number of fertile tillers per plant was 7–8% lower in tetraploid Stål than in the diploid parent variety and also the total number of florets per ear was about 10% lower. The percentage of rudimentary florets was high in the tetraploids and was markedly affected by environment.
Tetraploid Stål gave a 12% lower yield than the diploid, though its grain weight was 44% higher.
Field tests to ascertain the optimum conditions for the tetraploid are needed and, in further breeding for grain yield, selection should be carried out for vigour, a high number of fertile tillers and of florets per ear, high fertility and a low percentage of rudimentary flowers.

1128. Medvedev, P. F.
(**The viability of hybrid seed of winter rye in the field**).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 10 : 21–24. [Russian].

In experiments at the Leningrad State Breeding Station several varieties of rye produced more healthy and viable seed as a result of open intervarietal pollination. The vitality and viability of the seed of some varieties were further improved by open pollination in the second generation. The effect of pollination was most marked upon varieties cultivated in the steppe zone.

1129. Nikitenko, G. F.
(**An instance of mass branching of the ears of winter rye**).
Agrobiologija (Agrobiology) 1951 : No. 3 : 135–36. [Russian].

Frequent development of branching ears was observed in 1950 in fields of Kazanskaja [Kazanj] and Lisicyna [Lisicyn's] winter ryes and other varieties of rye at the Mordva State Breeding Station and elsewhere in the Mordva ASSR. The widespread phenomenon is attributed to an abnormally early and warm spring. Cereals with branching ears being regarded as promising breeding material in the USSR, 1022 such rye plants have been selected. The seed of 750 plants was sown for further observation.

1130. Gluhih, K. A.
(**The effect of training upon the inheritance and vitality of Vjatka rye**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 11–18. [Russian].

Differences in morphological and economic characters between élites of the rye variety Vjatka originating from Kirovsk, Jaroslavlj, Novosibirsk, Moscow and Falenki were studied at the Zonal Scientific Research Institute of Agriculture for the North-East, Kirovsk.
The élites became uniform in respect of their morphological and economic properties when grown under the same conditions for two generations without spatial isolation.

MAIZE

1131. Schmidt, J. W. and Frolik, E. F.
Comparative effects of thermal neutron irradiation of maize pollen and maize seed on subsequent seedling growth.
J. Hered. 1951 : **42** : 173–77.

The susceptibility of maize seed from the single cross L 289 x I 205 and maize pollen of I 205 to varying periods of exposure to a thermal neutron flux of 7 x 10^{10} neutrons/cm.^{2}/sec. from the heavy water pile at the Argonne National Laboratory, Chicago, was determined through effects on subsequent seedling development at Lincoln, Neb. The irradiated pollen was used to pollinate untreated L 289 inbreds.
Increasing the length of seed exposure to neutrons from 1 to 8 min. produced an increased number of more upright and narrower leaves, many leaf anomalies such as mottling, striping, wrinkling, slashing and one-sided development, reduction in plant height and, in some extreme cases, delayed death. Seedlings carrying the effects of pollen irradiation showed reduction in plant height and decreased maximum stand. On the basis of comparisons with untreated seedlings and material exposed to X rays of 1200 r. for pollen and 7500 r. for seed, neutron irradiation of the seed was approximately 12

times as efficient in depressing seed growth as exposure of the pollen to neutrons. As it is improbable that ionization in the seed could alone account for the difference in efficiency, it is suggested that transmutation of part of the nitrogen component of nucleic acid to carbon may be a contributory factor.

1132. Shlomi, A.
(Report on the rearing of hybrid maize in 1950).
Hassadeh 1951 : **31** : 576–80. [Hebrew].
During the past three years trials with pure strains, single hybrids and double hybrids of maize have been carried out at Naveh Ya'ar and under differing soil and climatic conditions elsewhere in Israel.
Plants from self-fertilized lines of Israeli strains of White Dent, De Wolff and Waldheim proved less exacting as to soil requirements than hybrids and, on account of their deep root system, could be grown successfully where the average yearly rainfall was below 400 mm. Through selection of parent plants, the yield per dunam in arid areas has been raised from 120 kg. to 150 kg.
In 1949 American strains were intercrossed and the resulting hybrids put on trial in 1950. Average yields were 300 kg. per dunam. Trials with double hybrids have been less successful.
Other work was done on intercrossing late varieties with mid-season and early varieties. In an attempt to raise forage varieties, crosses have been made between Israeli Dent, German Dent and Station Laguna, also between Station Laguna and sweet corn. In 1950, seed of 118 pure lines and 50 open-pollinated varieties was germinated below optimum temperatures. Seedlings which began to form chlorophyll at 12° C were grown on and may possibly provide material for selection of strains that can be sown early in the year.

1133. Cunningham, J. C. (compiler).
Maize bibliography for the years 1937 to 1945, inclusive.
Contr. Ia. Corn Res. Inst. 1951 : **3** : 199–298.
The bibliography is arranged alphabetically by subject and is followed by an author index. It includes a section on various aspects of breeding and genetics.

1134. Buchinger, A.
Neue Wege in der Maiszüchtung. **(New ways of maize breeding).**
Jb. Hochsch. Bodenkult., Wien 1948 : **2** : 39–46.
An outline is given of the advantages of hybrid corn and the methods of producing it. The best inbred lines from the USA are being crossed with the best local varieties in a programme of maize improvement in Austria.

1135. **Seed of Texas 30, new hybrid corn, available for next year.**
Crops and Soils 1951 : **4** : No. 2 : p. 25.
Texas 30, a hybrid maize developed at the Texas Experiment Station for the Blackland Prairie and East Timber regions, will be released for the 1952 season. It matures 5–10 days later than Texas 26, and has slightly outyielded the three widely grown varieties Texas 24, 26 and 28 in the past two years.

1136. Kerle, W. D.
Maize hybrids and varieties. District recommendations for 1951 sowing.
Agric. Gaz. N.S.W. 1951 : **62** : 351–55.
New yellow hybrids recommended for New South Wales are described. Early maturing hybrids comprise Dawn, Emblem, Sterling and Sunrise, developed at the New England Experiment Farm, and DS 28, synonymous with the American hybrid US 13. These hybrids are resistant to cob rot but susceptible to leaf blight. Late maturing hybrids comprise Standfast, Ensign and Victory, bred at the Grafton Experimental Farm; they are resistant to leaf blight. The results of trials have indicated that hybrids of all maturities have the ability to give substantially higher yields of grain than open-pollinated varieties; the hybrids have also proved greatly superior for fodder and silage. Hybrids and open-pollinated varieties recommended for grain or fodder and silage in the different districts of New South Wales are listed.

1137. Bunting, E. S. and Blackman, G. E.
An assessment of the factors controlling the productivity of maize in England.
J. Agric. Sci. 1951 : **41** : 271–81.
The results of 30 field experiments, carried out in southern England between 1942 and 1950, to assess the grain and forage potentialities of 17 open-pollinated flint and dent maizes and 29 single and double cross hybrids from North America are presented. Although the hybrids are superior to the open-pollinated varieties in all characteristics other than earliness, the superior yields of the former are only apparent in unusually favourable years; in normal seasons the hybrids are too late to ripen grain. On the other hand, many are suitable for silage production.

Sibthorp, a selection from an unknown German variety, is the earliest maize tested and gives the highest average yield, which is far below the potential yielding capacities of most North American types.
At Oxford, a number of selections capable of surviving in cold wet soils have been obtained, but so far none shows the rapidity of germination required to shorten the period from sowing to maturity by the necessary minimum of 14 days.

1138. Sorokin, C.
Inbreeding is again in favor in Soviet Russia.
J. Hered. 1951 : **42** : 135–36.

Reference is made to recent trials on maize hybrids between inbred lines, reported by Sokolov (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1807).

1139. Koski, V. M. and Smith, J. H. C.
Chlorophyll formation in a mutant, white seedling-3.
Arch. Biochem. Biophys. 1951 : **34** : 189–95.

This mutant of *Zea Mays* is unable to accumulate appreciable quantities of chlorophyll when illuminated.

1140. Andrés, J. M.
Una nueva mutación que gobierna la síntesis de la licopina y carotinas en el maíz. (**A new mutation governing the synthesis of lycopene and carotenes in maize**).
Rev. Argent. Agron. 1951 : **18** : 136–42.

Two selfed ears of a yellow flint maize segregated for red colour of the embryo; the red seeds failed to germinate but the yellow grains gave rise to plants which again segregated yellow and red grains in the ratio 3 : 1, though deficiencies of the red group were often observed. In some of the mutant forms the red pigment extended also into the endosperm and aleurone. Spectral analysis of the pigment showed it to be lycopene. Plants arising from the red grains were all albino and nonviable.
Linkage studies showed the gene to be in chromosome V and it is given the symbol *lc*.

1141. Musiĭko, A. S.
(**Intravarietal hybridization of maize**).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 9 : 3–9. [Russian].

Importance is attached in breeding maize at the USSR Institute of Breeding and Genetics, Odessa, to (*a*) correct choice of the male and female parents from productive adapted local varieties, (*b*) the use of well developed seed taken from plants cultivated upon good soil and improved by cross pollination and selection, (*c*) planting of male and female varieties in alternate rows, (*d*) good cultivation and repeated supplementary fertilization, and (*e*) individual ear selection and selection within the ear itself.
Some evidence of the effectiveness of these Mičurinite breeding methods is presented.
The following highly productive hybrids have been recently developed by these methods at the institute: Odesskiĭ 1 [Odessa 1] from Dnepropetrovskaja [Dnepropetrovsk] x Gruševskaja Odesskaja [Odessa Gruševskaja], Odesskiĭ 2 from Dnepropetrovskaja x Harjkovskaja 23 [Harjkov 23], Odesskiĭ 4 from Harjkovskaja 23 x North Dakota and Odesskiĭ 5 from Belaja Zubovidnaja Harjkovskaja [Harjkov White Dent] x Kremnistaja Skorospelaja [Early Flint]. Odesskiĭ 1 and Odesskiĭ 2 outyielded the standard Dnepropetrovskaja in state trials.
Odesskiĭ 4 was earlier and more productive than its female parent and outyielded several other high yielding varieties.
Multiparental fertilization was discussed in connexion with the choice of breeding material. Mention is made of a hybrid obtained from pollination of Dnepropetrovskaja with the mixed pollen Gruševskaja Odesskaja + Moldavanka s Belym Steržnem [Moldavian White Rachis] + Moldavanka s Krasnym Steržnem [Moldavian Red Rachis]. This hybrid outyielded Dnepropetrovskaja, Gruševskaja Odesskaja and Odesskiĭ 1. Some evidence has been obtained that heterosis of intervarietal hybrids can be maintained for several generations provided Mičurinite methods of cultivation and selection are used. Some data relating to productiveness and earliness of Odesskiĭ 1 are given. Reference is also made to Partizanka [Partisan], a hybrid of Sterling x Harjkovskaja; it has been grown for several generations without losing its high yielding capacity.

1142. **Corn's birthplace ?**
Corn, N.Y. 1951 : **7** : No. **4** : 1–2.

Information regarding the possible centre of origin of maize is briefly discussed.

1143. Yamasaki, Y.
(**The origin of maize varieties**).
Ikushugaku Zasshi/Jap. J. Breeding 1951 : **1** : p. 20. [Japanese].

A brief historical review is presented of theories of the origin of maize and of its principal varieties from those of Saint Hilaire to those current to-day.

1144. Weatherwax, P.
El origen del maíz. (The history of corn).
Ciencia e Investigación, B. Aires 1951 : **8** : 387–401.
A Spanish translation is given of the article summarized in *Plant Breeding Abstracts*, Vol. XXI, Abst. 298.

1145. Mesa-Bernal, D.
Un importante descubrimiento en Colombia relacionado con el origen del maíz. (An important discovery in Colombia relating to the origin of maize).
Agricultura Trop., Bogotá 1951 : **7** : No. 4 : 35–38.
The variety Indio [Indian], grown at Pueblo Rico, Caldas (Colombia), has been shown to resemble one of the Assamese maize varieties believed by Stonor and Anderson to represent pre-Columbian types (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1009).

1146. Schultz, J.
The effect of ultra-violet radiation on a ring chromosome in *Zea Mays*.
Proc. Nat. Acad. Sci., Wash. 1951 : **37** : 590–600.
Investigations were carried out on the effects of ultraviolet and X irradiation on the ring involving the small duplication (Dp 3a) for the region of chromosome 3 which includes the allele *Ab* for colour of endosperm and plant. Ultraviolet irradiation of pollen carrying the ring chromosome led to loss of the ring with a high frequency in endosperms and seedlings. This loss is considered to be due to breakage and restitution. Although a dose of X rays (1000 r.) produced a more severe effect on embryo abortion it had a much lower effect upon ring loss than ultraviolet irradiation. Treatment with ultraviolet light alone had the same effect on the ring chromosome as it had when combined with X ray pretreatment; the usual inhibition of the X ray effect by ultraviolet light was however obtained, as shown by the absence of germless seeds in the doubly treated group.

1147. Sadana, J. C.
Observations on the carotenoid pigments of local varieties of yellow maize.
Indian J. Med. Res. 1946 : **34** : 59–68.
Six carotenoid pigments were detected during analysis of 15 varieties grown in the Punjab. Differences in total carotenoid content ranged from 18·76 μgrm. per grm. in pale yellow varieties to 40·78 μgrm. per grm. in types with reddish yellow coloration.

1148. Teas, H. J. and Anderson, E. G.
Accumulation of anthranilic acid by a mutant of maize.
Proc. Nat. Acad. Sci., Wash. 1951 : **37** : 645–49.
A mutant in which the leaves of seedlings and the anthers fluoresce blue in ultraviolet light is reported (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1827). The mutant is due to a single gene, expressed as a recessive in the seedling stage and as a dominant in mature plants.

1149. Moody, G.
Hybrid corn equals open pollinated types in feeding quality.
Crops and Soils 1951 : **4** : No. 2 : p. 25.
Results of chemical analyses carried out at Virginia Agricultural Experiment Station show that there is no significant difference between the nutrient content of hybrid and open-pollinated maizes used for fodder.

1150. Leng, E. R., Earle, F. R. and Curtis, J. J.
Direct effect of pollen parent on protein content of the corn kernel.
Cereal Chem. 1951 : **28** : 479–82.
The influence of the ♂ parent on the protein content of the maize grain was estimated by fertilizing Illinois High Protein and Illinois Low Protein with each of two pollen mixtures comprising: (*a*) Illinois High Protein and an inbred, Oh. 28, with low protein content; and (*b*) Illinois Low Protein and an inbred, 48–234, with high protein content. Grains fertilized by either Oh. 28 or 48–234 developed yellow endosperm and were thus distinguishable from others on the same ear. Statistically significant differences in protein content resulting from the direct effect of the ♂ parent were recorded, but the greatest mean difference (0·36%) was too small to be of practical importance; much larger differences were caused by variation in seed set. The inheritance of protein content is best determined by using each genotype as a ♀ parent and allowing open pollination, thus ensuring a full seed set.

1151. Cooper, D. C.
Caryopsis development following matings between diploid and tetraploid strains of *Zea Mays*.
Amer. J. Bot. 1951 : **38** : 702–08.
The course of caryopsis development in grains with yellow endosperm and coloured aleurone obtained from crosses between a $2n$ strain, with

yellow endosperm (*Y*) and colourless aleurone (*aCR*), and a 4*n* strain, with a nonyellow endosperm (*y*) and a colourless aleurone (*ACr*), was compared with caryopses developing from crosses within the 2*n* and 4*n* strains. Double fertilization occurred in all crosses and development was comparable up to 4 days following pollination. Subsequently, meristematic activity in 2*n* x 4*n* hybrids became abnormally precocious in the adgerminal region of the endosperm (4*n*); the embryo was deeply embedded and in most grains finally disintegrated under pressure. In 4*n* x 2*n* hybrids both embryo and endosperm (5*n*) developed normally for a further 2 days, then starch was deposited throughout the endosperm alone. Although the embryo continued to grow and differentiate in a normal manner it contained no reserve nutrients and consequently ceased growing after about 20 days.

The fact that very few hybrid seedlings were obtained was not, therefore, due to the triploid condition of the embryos.

1152. Shaw, R. H. and Thom, H. C. S.
On the phenology of field corn, silking to maturity.
Agron. J. 1951 : **43** : 541–46.

In an investigation of maize maturity at Ames, Ia., differences were found between early, medium and late varieties in respect of the date at which the maximum dry weight of the grain was reached, and the percentage moisture content of the grain at maturity.

1153. Sprague, G. F. and Federer, W. T.
A comparison of variance components in corn yield trials: II. Error, year x variety, location x variety, and variety components.
Agron. J. 1951 : **43** : 535–41.

Estimates of the relative magnitude of the variety x location and variety x year components of variance to the error variance component have been obtained from a series of top cross, single cross and double cross yield comparisons of maize grown in 12 districts of Iowa from 1940 to 1947. Formulae are given for obtaining the best combination of number of replicates, years and locations for a given number of varieties.

1154. Nakamura, N.
(On testing combining ability in the S_0 in maize and on synthetic varieties).
Ikushugaku Zasshi/Jap. J. Breeding 1951 : **1** : 10–14. [Japanese].

Original material of Japanese common white maize was divided into 4 lots in respect of combining ability in top and sib crosses with the original variety. Lot A gave a good performance in both top and sib crosses, B did well in top crosses but poorly in sib crosses, C did badly in both cases, while D performed well in sib crosses but poorly in top crosses. The S_0 plants were then selfed and intralot crosses made in the S_2 to give synthetic varieties designated A, B, C and D, respectively. On comparing the synthetics with the original variety, synthetic A, with the highest combining ability, proved superior under optimum conditions; under drier conditions, synthetic D with lower combining ability did better.

1155. **Out of one, many.**
Corn, N.Y. 1951 : **7** : No. 4 : p. 1.

A plan to establish a collection of all maize varieties grown in the US, and thus facilitate selection of breeding material for particular requirements, is outlined.

1156. Fedorov, A. A.
(The study of the phenomena of branching of maize ears).
Bot. Ž. (Bot. J.), Moskva 1951 : **36** : 341–48. [Russian].

An abnormal maize plant, with an ear consisting of a central and 13 lateral branches producing jointly 915 well developed kernels, was found in a field of a local variety at Pogrebeny, Moldavia. The phenomenon is explained by reversion, previously observed in maize and other Maydeae.

The economic and practical aspects of breeding maize for branching ears are regarded as promising. Mičurinite breeding with material obtained from branching ears is in progress at the Komarov Botanical Institute, Leningrad. The methods include varied photoperiods and training upon good soil.

1157. McKeen, W. E.
Seedling susceptibility of dent corn inbreds to rootrot caused by *Pythium arrhenomanes*.
Sci. Agric. 1951 : **31** : 475–79.

Of 28 maize inbreds, R 4 was the only one with sufficient seedling resistance to *P. arrhenomanes* to continue growing normally in infested greenhouse plots. A single cross hybrid, R 4 x Hy, and the double cross hybrid (R 4 x Hy) x (187–2 x WF 9), with 3 susceptible grandparents, grew more vigorously than susceptible inbreds in infested soil owing to heterotic effects on

rooting capacity and subsequent establishment. Results of additional trials show that factors controlling resistance to *P. arrhenomanes* and *Gibberella Zeae* are inherited independently.

1158. Gheorghianov, V. and Fischer, G. J.
El carbón del maíz. Ataque observado en los ensayos comparativos de variedades comerciales realizados en La Estanzuela. (**Maize smut. Attack observed in comparative tests of commercial varieties carried out at La Estanzuela**).
IV Conf. Interamer. Agric. II Reun. Reg. Latinoamer. Agric. Aliment. 1950: 210–24.

The variety Cuarentón, produced at the La Estanzuela breeding station in Uruguay, proved the most resistant. The hybrid of Cuarentón x Colorado was more susceptible than the parents, whereas the synthetic hybrid Estanzuela 2, obtained by mixing the two varieties Colorado La Estanzuela and Colorado Klein, was equal to its parents in resistance.

1159. Benada, J.
Příspěvek ke studiu helminthosporiové nákazy některých soret kukuřice. (**A study of *Helminthosporium* infection in some maize varieties**).
Sborn Čsl. Akad. Zeměd. 1951 : **24** : 288–300.

In infection trials conducted at Brno, none of the 17 Czechoslovakian varieties and 40 North American hybrid maizes proved resistant to *Helminthosporium turcicum.*

1160. Schaal, W.
New corn hybrids promise to boost Virginia corn yields.
Crops and Soils 1951 : **4** : No. 2 : p. 26.

Two high-yielding yellow maize hybrids, Virginia 9045 and Virginia 9002, have been developed for the Piedmont area by the Virginia Agricultural Experiment Station. Both possess a high degree of resistance to leaf blight and stalk rot, and Virginia 9002 withstands lodging. Virginia 9045 outyielded US 13 by 7 bushels per acre.

1161. Coon, B. F.
Japanese beetle damage in field corn.
Progr. Rep. Pa Agric. Exp. Sta. 1951 : No. 55 : Pp. 7.

Numerous single cross maize hybrids were grown at Lancaster and Hershey, Pa., on plots with different Japanese beetle populations. Data are presented on the percentage beetle damage to stigmas, grain development per ear and total grain yield in respect to plant maturity and moisture content. At Hershey, where the beetle population was small, some hybrids were more susceptible to injury than others; many early maturing hybrids produced comparatively undamaged ears. No significant differences in degree of susceptibility were found between hybrids at Lancaster where beetle infestation was severe.

1162. Reyes, G. M.
Progress of investigation on the yellow stripe disease of corn.
Philipp. J. Agric. 1950 (1951) : **15** : 105–17.

Variation in degree of resistance to the virus causing yellow stripe, a disease previously unknown in the Philippines, was recorded among locally grown maizes. Lipa White Lagkit, Calauang White Lagkit and Calamba Yellow Flint proved resistant in trials at the Central Experiment Station, Manila. Pangasinan White Lagkit, a variety with otherwise desirable characteristics, is very susceptible to yellow stripe, but the F_1 from Pangasinan White Lagkit x Calamba Yellow Flint shows a high degree of resistance. Further hybridization is in progress to combine desirable qualities of both parents.

1163. Trentin, A. and Rossi, G.
Risultanze di una prova sperimentale su 44 tipi di mais ibridi. (**Results of an experimental test of 44 types of hybrid maize**).
Suppl. Ann. Sper. Agrar., Roma 1951 : **5** : LI–LXI.

The present report relates to trials run in 1950 by the Experimental Station for Beet Culture, Rovigo, Italy. Except for four very late hybrids, the American material surpassed the Italian varieties Marano Vicentino and Nostrano dell'Isola in yield. The Italian types are very subject to pyralid attack and their grain is not sufficiently strongly coloured or vitreous for popular taste in the Polesine district.

1164. Joglekar, R. G. and Kaushikkar, T. V.
Trial of American hybrid corn for cultivation in Madhya Pradesh.
Nagpur Agric. Coll. Mag. 1950 and 1951: **25** : Nos 3 and 4 : 15–17.

The results of trials at the Nagpur Farm suggest that some American hybrids have superior yielding ability. The increase in yield of the hybrids over that of the local maize is attributed

chiefly to a higher percentage weight of grain to cob and greater 1000 grain weight.

BARLEY

1165. Ulonska, E.
Die Sommergerste in den bayerischen Landessortenversuchen 1950. (Spring barleys in the Bavarian state tests for 1950).
Z. Pflanzenb. Pflanzenschutz 1951 : **2** : 97–114.

Of the nine varieties tested, Breuns Franken III and Strengs Franken III proved the best in early development, vigour and stand; the former was distinguished also by its drought resistance. The highest yield of straw was given by Ackermanns Isaria, which had the tallest straw; Heines Haisa had the shortest straw, Ackermanns Donaria and Strengs Franken III the strongest. The latest in ripening was Ackermanns Isaria, the earliest Schweigers Erika. The varieties with the best grain form were Donaria and Breuns Franken III. Protein content was highest in Ackermanns Isaria with 13·7% and lowest in Strengs Franken III with 12·8%. The highest grain yields were given by Breuns Franken III and Strengs Franken III, the lowest by Ackermanns Isaria.

1166. Konzak, C. F., Randolph, L. F. and Jensen, N. F.
Embryo culture of barley species hybrids. Cytological studies of *Hordeum sativum* x *Hordeum bulbosum*.
J. Hered. 1951 : **42** : 125–34.

H. bulbosum ($2n = 28$) has exhibited a high degree of powdery mildew resistance and a fair degree of hardiness at Ithaca, N.Y. Triploid F_1 hybrids between this species and *H. sativum* ($2n = 14$) were obtained by embryo culture, using the latter species as female. Synaptic behaviour provided evidence of relatively close homology between the chromosomes of the two species. The hybrids produced up to 23% stainable pollen and apparently normal ovules, but no seed was secured from the hybrids or from back crosses to *H. sativum*. In addition to partial incompatibility between chromosomes and irregular disjunction, genes for self incompatibility from *H. bulbosum* are probably responsible for the hybrid sterility; varieties of *H. sativum* with genotypes capable of inactivating these genes may be required for further breeding.

1167. Mechelke, F.
Über sporadische Polysomatie in Wurzelspitzen bei *Hordeum vulgare* L. (**On sporadic polysomaty in root tips in *H. vulgare* L.**).
Öst. bot. Z. 1951 : **98** : 420–26.

Endomitotic chromosome multiplication as exhibited in three cases of tetraploid mitoses in root tips of separate plants is described and illustrated.

1168. Ono, T.
(Investigations on the production of polyploids of barley and other cereals).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : 55–56. [Japanese].

Data are provided on the number of spikelets per ear and fertility of a series of colchicine-induced tetraploid strains of Japanese barley varieties. Fertility was frequently over 90%. Tetraploids of *Eleusine coracana* were much less fertile than the diploids, though the grains were larger.

1169. Derscheid, L. A.
Responses of progeny of barley sprayed with 2,4-D.
Agron. J. 1951 : **43** : 517–18.

No evidence was obtained that reduction in yield due to 2,4–D spraying was inherited by the succeeding generation.

1170. Bateman, A. J. and Mather, K.
The progress of inbreeding in barley.
Heredity 1951 : **5** : 321–48.

Data are presented from an investigation of variance in ear size of barley using self-pollinated progenies from the original cross Spratt x Irish Goldthorpe; the same material was used for the biometrical analysis of D and H (cf. *Plant Breeding Abstracts*, Vol. XIX, p. 913).
Methods by which estimations of progress towards homozygosis and effects of natural selection can be made are discussed, with reference to application of the biometrical analysis of continuous variation by which variances and covariances, calculated from each generation, are expressed in terms of D, H and E.
Experimental results gave some evidence of natural selection; this appeared to be selection against intermediate phenotypes rather than against either heterozygous or homozygous forms. When analysed, mean variances, on the one hand, and covariances and variances of means, on the other, gave values of D and H

which were higher in the S_2 and S_3 than in subsequent generations. It is assumed that coupling linkage, rather than selection for homozygotes, was responsible for these results.

1171. Nikitenko, G. F.
(A branching barley).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 5 : 11–18. [Russian].

Breeding and Mičurinite training of barley for branching ears at the Mordva State Breeding Station are reported. The material comprised some plants with partially developed branching habit, the F_1, F_3 and F_4 of different intervarietal hybrids, mostly from the crosses between Viner and the best hulled and naked barleys, and the F_0 and F_3 seed generations of some vegetative intervarietal hybrids.

The training methods consisted of changing the photoperiods and moisture and nutrient supply, and the stimulation of earing of tillers left intact after checking the growth of others by removal of the apical leaves. Several branching barley plants have been obtained which are superior to the nonbranching standard Kazanskiĭ 6/4 [Kazanj 6/4] in respect of some economic characters including length of ear, number of grains per ear and 1000 grain weight. The most promising hybrids were the F_3 from Viner 01163 x Erectum 1010/136 and the F_3 from Viner 01163 x Nutans 1504. Plants 64/4 and 64/12 derived from the former cross shed their awns before they reached maturity.

1172. Sawicki, J.
Studies on the structure of the aleurone layer in varieties of the cultivated barley *Hordeum sativum* Jess.
Bull. Int. Acad. Cracovie 1950 : Sér. B : No. 4–10 : 101–48.

Data are presented on the number of cell rows in the aleurone layer and the thickness of the latter in 103 spring barley varieties, representative of all subspecies and botanical varieties of *H. sativum*, grown at Mydlniki, Poland. Comparisons were made between seed samples of 28 additional varieties obtained from Cambridge, England, and grain produced by these varieties when grown at Mydlniki.

Individual variation within the limits of a variety proved so small, both in different environments and different years, that the characteristics of the aleurone layer may be used taxonomically, to determine centres of origin, and as a means of selection for breeding purposes.

1173. Vogel, E. H. (Jun.).
A new malting variety.
Techn. Proc. 63rd Ann. Conv. Master Brewers Ass. Amer. 1950 : 118–24. [from Wallerstein Laboratories Communications 1951 : **14** : p. 250].

Data are given on the performance of Moore barley (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1801) in preliminary brewing tests, in comparison with Kindred. The variety includes Wisconsin Barbless, Chevron and Olli in its parentage. The tests indicated that Moore is entirely satisfactory for the production of quality beer.

1174. Lejeune, A. J., Sisler, W. W., Banasik, C. J. and Harris, R. H.
Methods of breeding new malting barley varieties.
J. Inst. Brew. 1951 : **48** : 445–49.

Techniques used at the North Dakota Agricultural Experiment Station to breed and select barleys combining disease and drought resistance, winter hardiness, early maturity, strong straw, high yielding capacity and good malting quality are outlined. Eleven promising hybrids obtained from the F_6 of Kindred (L) x Titan were selected on the basis of the quality performance of their F_3 ancestors. With the exception of diastase content, all eleven selections are equal or superior to Kindred (L) and other standard varieties; four hybrids, including C–47–15–55–3–7 which shows outstanding promise, have sufficient diastatic activity.

1175. Rudorf, W. and Wienhues, F.
Die Züchtung mehltauresistenter Gersten mit Hilfe einer resistenten Wildform (*Hordeum spontaneum nigrum* H 204).
[**Breeding mildew resistant barleys with the aid of a resistant wild form (*H. spontaneum nigrum* H 204)**].
Z. Pflanzenz. 1951 : **30** : 445–63.

The varieties Ragusa and Pflugs Intensiv, previously used as sources of mildew resistance in Germany, were resistant to a limited number of biotypes only. The wild barley *H. spontaneum* var. *nigrum* however proved to be resistant to all biotypes, except the mutant F which does not occur in nature in Germany. The wild barley was first used for crossing in 1934 by Hoffmann and Kuckuck (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 1196), who used a combination of back crossing and selfing; the present article reports the results of a study of 15 selections from the first back cross and 4 from the second back cross for spring barleys. The results have shown that it is possible from

the first back cross to select mildew-resistant lines which excel the best cultivated parent varieties in yield, though they were inferior in malting quality and standing capacity. The best back-cross parents in combination with Imperial x H 204 were Kenia and Haisa I. Short, strong-strawed segregates occurred quite frequently but never in conjunction with high yield. Line 8053 showed transgression for earliness, in which it exceeded Haisa I by eight days, but was unsatisfactory in yield.

The products of the second back cross were in general better in yielding capacity and in quality. They contained some lines which exceeded Haisa I by 20%; the cross [Haisa I x (Imperial x H 204)] x Weihenstephaner II gave particularly good combinations of mildew resistance, yield, grain quality and strength of straw. The mixed hybrid population from which this line was selected also exceeded Haisa I slightly in yield.

Back crosses of the resistant spring barley lines with winter barleys were also studied; 4 out of 23 mildew resistant hybrids tested in 1949 proved promising. All four ripened a few days before the standard, and line 1144/48 [(Imperial x H 204) x Peragis] x (Peragis x Bihor), exceeded the standard, Peragis 12, by 28% in yield; the hybrids were equal to the best winter barleys in standing capacity, and withstood temperatures of — 17° C in 1950 without any damage.

Tests in the greenhouse have shown that resistance does not always segregate in clear 3 : 1 ratios, and in the back crosses with Weihenstephaner II, which contains a gene for resistance to certain biotypes, the greenhouse results did not agree fully with results of resistance tests in the field; the main resistance gene in H 204 was only partially dominant and was influenced in its expression also by other genes. The resistant forms obtained from these crosses have however proved free from attack by all biotypes so far occurring in Germany.

1176. Sviridonov, M. G.
(Local barleys of the Tuva province).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 31–35. [Russian].

The range of local forms of barley occurring in pure and mixed populations is described, with reference to naked, 2-rowed, 6-rowed, *vulgare*, *pallidum*, *persicum*, green and black types. The main part of the article describes the morphological and agricultural characters of Local Barun and Black Barun barleys. Both varieties are adapted to the cold dry conditions of Tuva.

MILLETS AND SORGHUMS

1177. Chavan, V. M., Chaudhari, B. B. and Patil, J. A.
Improved varieties of rala (navane-fox-tail millet) for Bombay State.
Poona Agric. Coll. Mag. 1951 : **42** : 69–72.

At the Niphad Cereal Breeding Station, several selections of *Setaria italica* made from bulk samples collected in the Nasik district have shown promise. Niphad–30–1 and Niphad–31–1 have outyielded local varieties over four seasons; they were subjected to detailed analyses during 1950–51. Both selections show similarity in respect of medium plant height, purple stems, long loose inflorescence tapering towards the apex and yellow grain. Niphad–31–1, however, has a higher protein and soluble carbohydrate content than Niphad–30–1, and on this superior nutritional basis has been chosen for release to growers in many Bombay districts.

1178. Zalesov, F. B.
(A new variety of millet).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 72–74. [Russian].

Kamalinskoe 591 [Kamalino 591] was obtained by individual selection from local millets at the Kamalino State Breeding Station. In trials with the standard Kazanskoe 506 it was 9 to 12 days earlier, yielded 2·4 c. more grain per ha. and had a higher 1000 grain weight and a lower chaff content. The grain cooks well and the variety shows resistance to lodging.

1179. Jones, M. D. and Sieglinger, J. B.
Effect of wind direction on natural crossing in sorghum, *Sorghum vulgare* Pers.
Agron. J. 1951 : **43** : 571–72.

The percentage cross pollination in sorghum has been investigated at the Oklahoma Agricultural Experiment Station, using normal Durra CI 696, with plump grains, and a strain with defective endosperm. The latter characteristic, readily distinguished by the shrunken appearance of the grain, is inherited as a simple recessive. Comparisons were made between natural crossing when the defective type was surrounded by the normal, and when the defective strain was planted on the north, south, east and west of adjoining plots of the normal variety.

RICE

1180. **Rice varieties : a correction.**
Agric. J. Fiji 1950 : **21** : p. 91.

It is noted that the varieties BG 75 and BG 79 appear to have been interchanged several years ago at the time of their first introduction to Fiji.

1181. Nagao, S. and Takahashi, M.
(On the gene *Pn* responsible for pigmentation of the stem node in rice. Studies in rice hybridization, XII).
Ikushugaku Zasshi / Jap. J. Breeding 1951 : **1** : 59–65. [Japanese].

Pn brings about anthocyanin formation in rice nodes in the presence of suitable combinations of the *C* and *Sp* multiple allelomorphic genes, which condition pigmentation in the spikelet. *Pn* is linked with *Sp*, the cross over value approximating to 18%.

1182. Nagao, S. and Takahashi, M.
(Studies on linkage in rice).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : 22–23. [Japanese].

The following linkage groups have been established: (1) *g* (long glume) — d_6 (dwarf) — *C'* (brown rice); (2) *Sp* (anthocyanin suppression) — *Rd* (red rice) — *Di* (dilution of grain pigmentation); (3) *M* (endosperm type) — d_3 (dwarf) — *Pla* (Purple leaf margin); and (4) *Pl* (purple leaf lamina) — d_2 (dwarf).

1183. Komatsu, T.
(On hybridization of upland rice varieties in the Tokai district).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : p. 16. [Japanese].

In this brief report of an extensive hybridization programme with Tokai rice varieties, the promising results are noted of crosses involving upland nonglutinous rices, upland glutinous rices, hybrids between these two classes, and hybrids between upland and irrigated rices.

1184. Livera, E. J.
The science in the agriculture of the Ceylon peasant.
Proc. 6th Annu. Sess. Ceylon Ass. Sci. 1950 : Pp. 16.

Information is given on pure line rice selections, suitable for particular environments, and hybrid strains with a wide range of adaptability.

1185. Luong Dinh Cua
Artificial polyploidy in the *Oryzae*. I. Cytogenetical studies on colchicine-induced autotetraploid rice, *Oryza sativa* L.
Seiken Jiho (Biological Report) 1950 : No. 4 : 43–53.

Awn development and increase in length of the ligule of the flag leaf and in size of spikelets and pollen grains were found to be especially useful in distinguishing colchicine-induced tetraploids of four varieties from the original diploids. Many pollen grains of the tetraploids had two or three germinal pores, whereas diploid grains generally possess one. Varietal differences in frequency of grains with more than one germinal pore were noted among the tetraploids. Pollen and seed fertility were reduced in the tetraploids; seed set did not correspond with the percentage of apparently normal grains. Number of spikelets per panicle was reduced to about 40% of the diploid value in all four varieties. The number of quadrivalents ranged from 3 to 12, with an average of 8.50.

1186. Luong Dinh Cua and Okuda, M.
A note on the effect of light interruption on rice plants receiving short photoperiods.
Seiken Jiho (Biological Report) 1950 : No. 4 : 54–56.

Plants of three varieties, undergoing short day treatment, were exposed to light for 15 minutes during the dark period of 15 hours. They headed later than both the controls and plants receiving short photoperiods only. These preliminary results suggest that light interruption is valuable as a means of controlling panicle emergence in breeding.

1187. Mizusima [Mizushima], U.
(Classification of rice varieties according to sexual compatibility).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : 53–54. [Japanese].

A table is given of the intercompatibility relationships of a series of Japanese, Indian, Hawaiian, Indochinese and Taiwan rice varieties.

1188. Cada, E.
Further observations on the occurrence and behavior of variations in upland rice.
Philipp. J. Agric. 1950 : **15** : 33–47.

Inheritance of variations observed in Caawa II, an early maturing variety grown in Manila, has been investigated in the F_2 arising from normal and variant seeds produced by aberrant individuals (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 329). The variation in panicle density, responsible for nearly twice the normal number of grains per panicle, did not appear in the F_2. Grain abnormalities were, however, inherited; these comprised twin kernels enclosed in a single pair of glumes, and twin kernels each having separate glumes. A variant of Guininto C, with grain having an extra palea, produced F_2

progeny possessing this character in addition to twin kernels, each enclosed by a pair of fasciated glumes.
Further variants bearing grains with extra paleae have been found among F_1 progeny of Caawa II x Fortuna and Kinafe x Fortuna, and in plants from the original stock of Caawa II.

1189. Chevalier, A.
Une nouvelle espèce d'*Oryza* sauvage de l'Afrique tropicale. (**A new species of wild rice from tropical Africa**).
Rev. Bot. Appl. 1951 : **31** : 378–82.
The wild rice *Oryza ubanghensis* and a new species of the related genus *Leersia*, *L. compressa*, are described and illustrated.

1190. Piacco, R.
Le razze di riso coltivate in Italia. (**The varieties of rice cultivated in Italy**).
Risicoltura, Vercelli 1951 : **39** : 235–39.
The concluding pages and table of contents and figures of the author's extensive review of the rices of Italy are presented (cf. Abst. 419).

1191. Cada, E., Valencia, L. C. and Nepumuceno, J.
A comparative test of five upland rice varieties under Pangasinan conditions.
Philipp. J. Agric. 1950 : **15** : 49–59.
Based on three seasons' accumulated data concerning time of maturity, yielding capacity and resistance to drought and lodging, Carti 42, Fortuna, Carreon and Dinalaga are recommended for the Pangasinan Province, Philippines, in place of Pinablo.

1192. Chavan, V. M. and Shendge, P. Y.
An improved 'Ambemohor' strain for the 'Maval' tract.
Poona Agric. Coll. Mag. 1951 : **42** : 62–64.
Data are presented on the performances of two new rice strains selected from Ambemohor at the Vadgaon Rice Breeding Station. Both Ambemohor 157 and 159 have consistently outyielded the parent variety over four seasons in the Maval tract of the Bombay Deccan. Of the two selections, Ambemohor 157 matures earlier, and it has finer straw, a better scent, more attractive husk colour and greater lodging resistance than the parent variety; it is therefore recommended to growers in the Poona district.

1193. Chandraratna, M. F.
Rice in Java.
Trop. Agriculturist 1951 : **107** : 103–09.
A general account is given of Javanese varieties with reference to their relative yielding capacities and resistance to lodging, shattering and local diseases. Several pure lines collected from different parts of Java are being used for breeding purposes in Ceylon.

1194. Hashioka, Y.
(The resistance of varietal assemblages of rice to *Corticium Sasakii* and *Helminthosporium sigmoideum*. Studies on breeding rice for resistance to disease, IV).
Ikushugaku Zasshi / Jap. J. Breeding 1951 : **1** : 21–26. [Japanese].
In a study of the resistance of numerous Japanese and Formosan rice varieties to the fungi cited above, it was ascertained that Formosan varieties are, in general, more resistant to *C. Sasakii* than Japanese lowland varieties, while the reverse holds for *H. sigmoideum*. In the latter case, resistance is more affected by environmental conditions and appears to be associated also with early maturation.
Crosses between varieties resistant and susceptible respectively to *C. Sasakii* showed that resistance is dominant, but the number of genes involved is uncertain.

FORAGE GRASSES

1195. Schaepman, H.
Een en ander over de veredeling van voedergewassen, vooral van grassen. (**Some points about breeding forage crops, especially grasses**).
Erfelijkheid in Praktijk 1951 : **12** : No. 15 : 1–4.
Having outlined the development of grass breeding in Holland and the various stages in producing new varieties of grasses the author gives a list of 15 characters on which selection of ryegrass in Holland is based (cf. Abst. 429). The writer advocates the collection of the best ecotypes, and from them the best phenotypes can be chosen as breeding material, to which the polycross technique and subsequently the polycross progeny test should be applied. A wide range of ecological types and a good number of clones should be retained for use in grassland cultivation.

1196. Burton, G. W.
Adaptability and breeding of suitable grasses for the southeastern states.
Advanc. Agron. 1951 : **3** : 197–241.
A detailed review is given of progress made in developing strains of *Poa pratensis*, *Dactylis glomerata*, *Cynodon Dactylon*, *Lolium multi-*

florum, *Festuca arundinacea*, *Paspalum* spp., *Eremochloa ophiuroides*, *Zoysia* spp., *Stenotaphrum secundatum*, *Sorghum* spp., *Digitaria decumbens*, *Axonopus affinis* and *Pennisetum* spp. suitable for the humid conditions of the southeastern United States.

1197. Popravko, A. V.
(Breeding and seed-growing work with forage plants at the Moršanskaja State Breeding Station).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 1 : 34–41. [Russian].

The most recent method of breeding grasses and leguminous forage plants used by the station involves development of artificial populations and training these for resistance to hardiness and water-logging in the spring; previous work on the selection of productive progenies from adapted populations had given disappointing results.

Grasses. Populations obtained by the above method include the brome variety 760, timothy 297, fescue 1304, *Arrhenatherum* 23, *Agropyron* 996, *Dactylis* 143, *Alopecurus* 769 and *Agrostis* 97a. A brome population, 312, is being tested. It was obtained by free cross pollination between nine different varieties and has yielded more seed and hay in the trials than the standard Moršanskiĭ 760.

Leguminous forage plants. The yellow hybrid lucerne, Marusinskaja 425, has been in cultivation for many years. The population is adapted to water-logged soils in the spring and is hardy and productive. A promising new population, 1248, was bred from the above population and a hybrid lucerne originating from Asia Minor, and was trained upon good soil for resistance to water-logging. It yields 60·37 c. hay per ha. and is more productive than the standard.

A red clover population, Marusinskiĭ 150, has also been improved by free cross pollination. It has given the productive new population 1010.

1198. Wit, F.
De toetsing van vorstresistentie van grassen en klavers in het laboratorium. **(Laboratory testing of grasses and clovers for frost hardiness).**
Studiekring voor Plantenveredeling 28 February, 1951 : Wageningen 392–97. (Mimeographed).

Winter hardiness is no simple conception, but is determined by several factors that have not the same value in different years. The method described is that used by Zijlstra for testing wheat. Seed is sown in autumn out of doors, and the plants are dug up carefully during the winter and tied up in bundles of 25–40 plants. These are kept for a day each at 0° C, — 2° C, and — 6° C, and are then cooled slowly to the desired degree. After several hours at this temperature they are brought back to 0° C slowly. After removing the dew they are placed in the light with roots in water and the damage is estimated on several subsequent days. Generally it is clearer after a week or two, and examination at 7, 10, 14 and 21 days is satisfactory.

1199. Jamalainen, E. A.
Förekomsten av övervintringssvampar på vallgräsen i Finland. **(The occurrence of overwintering fungi on pasture grasses in Finland).**
Nord. JordbrForskn. 1951 : **31-32** : 529–34.

The important role of overwintering fungi in the overwintering of pasture grasses has already been recognized by Ulander and Ekstrand (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1724) and further research has shown that plant material from central and northern Finland or Sweden or strains bred from such plants are more resistant to the overwintering fungi than strains of any other origin.

1200. Vedeneeva, R. S.
(Changing the winter habit of *Dactylis glomerata* into the spring habit).
Agrobiologija (Agrobiology) 1951 : No. 3: 30–33. [Russian].

At the USSR Scientific Research Institute of Cotton, Taškent, a winter variety of *D. glomerata* was changed into a spring variety by Mičurinite training and selection in the F_1, F_2 and F_3.

1201. Parodi, L. R.
Una nueva especie de gramínea del género *Agrostis* del delta del río Paraná. **(A new graminaceous species of the genus *Agrostis* from the delta of the Paraná river).**
Rev. Agent. Agron. 1951 : **18** : 143–46.

Descriptions are given of a new species, *A. platensis*, which seems to be derived from hybridization between *A. palustris* and *Polypogon elongatus*.

1202. Holt, E. C., Potts, R. C. and Fudge, J. F.
Bermuda grass research in Texas.
Circ. Tex. Agric. Exp. Sta. 1951 : No. 129 : Pp. 25.

Progress made in the development of improved strains of *Cynodon Dactylon* is reviewed with

particular mention of the outstanding characteristics of Coastal Bermuda (cf. *Plant Breeding* Abstracts, Vol. XVIII, Abst. 243).

1203. Burton, G. W.
Intra- and inter-specific hybrids in Bermuda grass.
J. Hered. 1951 : **42** : 153–56.

Coastal Bermuda (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1010), Indiana Bermuda, a selection of common Bermuda, and *Cynodon plectostachyum* were crossed in all possible combinations. One of the intraspecific hybrids, considerably more productive than Indiana Bermuda, has a high degree of cold resistance; the genes for hardiness, imparted by Indiana Bermuda, are apparently dominant. This hybrid may be of economic value in areas where Coastal Bermuda is winter-killed. Intraspecific hybridization appears to be a more promising method of improving *C. Dactylon* than crossing with *C. plectostachyum.*

1204. Brown, W. V. and Coe, G. E.
A study of sterility in *Hilaria belangeri* (Steud.) Nash and *Hilaria mutica* (Buckl.) Benth.
Amer. J. Bot. 1951 : **38** : 823–30.

Attempts to obtain interspecific hybrids from numerous clones of *H. Belangeri* ($2n = 36$) and *H. mutica* ($2n = 36$) collected in Texas proved unsuccessful. Cytological investigations, however, showed that degeneration of the ♀ gametophyte after the first division of the megasporocyte was responsible for 65–85% of this sterility.

1205. **Plant breeders report progress in project to improve Johnson grass.**
Crops and Soils 1951 : **4** : No. 1 : p. 27.

In a breeding programme carried out by the US Department of Agriculture to improve forage strains of Johnson grass, crosses were made with forage varieties of sorghum. Perennial selections have been obtained from the F_4 and F_5; these have lost the undesirable capacity for prolific vegetative reproduction by rhizomes, characteristic of Johnson grass. One outstanding selection with juicy stalks and a higher yielding ability than its annual sorghum parent is to be increased.

1206. Tabor, P.
New giant crab grass makes dense growth for pasture and soil protection in Florida.
Crops and Soils 1951 : **4** : No. 2 : p. 26.

A giant crabgrass known as Pangola, developed by selection at the Florida Experiment Station from seed obtained in the vicinity of the river Pangola, is recommended for soil conservation. It produces good quality forage and grows vigorously throughout the hot season in central and southern Florida.

1207. Godley, E. J.
Two natural *Agropyron* hybrids occurring in the British Isles.
Ann. Bot., Lond. 1951 : **15** : 535–44.

Comparative studies have been made of two interspecific hybrids, *A. pungens* ($2n = 42$) x *A. junceum* ($2n = 28$) and *A. repens* ($2n = 42$) x *A. junceum*; both are pentaploids ($2n = 35$) characterized by irregular meioses and sterility. Although *A. repens* and *A. junceum* generally flower simultaneously, hybridization can occur between *A. pungens* and *A. junceum* only on the rare occasions when their flowering periods overlap. *A. junceum* and *Elymus arenarius* flower at the same time but crosses are rare. Intergeneric crosses within the tribe Hordeae are discussed with reference to the difficulty of effecting artificial hybridization between the Triticinae and the Elymineae except via the genus *Agropyron*.

LEGUMINOUS FORAGE PLANTS

1208. Andreae, B.
Betriebswirtschaftliche Forderungen an die Luzernezüchtung. (**Requirements in lucerne breeding set by farming practice**).
Mitt. dtsch. LandwGes. 1951 : **66** : 798–99.

Various advantages of lucerne growing are enumerated. Two further improvements to which breeders are asked to give their attention are the production of forms with higher acid tolerance, capable of growing on poor, sandy soils, and of forms that will withstand grazing.

1209. Živan, V. P.
(A long-established local lucerne of Gorbašy).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 38–43. [Russian].

A hardy, high-yielding lucerne, withstanding drought and fungal diseases, has been grown since 1909 near the village of Gorbašy, Černjabrovskiĭ district, Žitomir province; it bears a resemblance both to the western and eastern European ecological types of *Medicago*

sativa, and appears to be a hybrid of this species and yellow lucerne.
The article contains tables of morphological data of interest to the plant breeder.

1210. Wilsie, C. P.
Self-fertility and forage yields of alfalfa selections and their progenies.
Agron. J. 1951 : **43** : 555–60.

Data are presented on combining ability, interfertility relationships and forage yields of lucerne selections made at Ames, Ia., from F_1 hybrids derived from a number of three-way crosses involving three groups of unrelated material showing a wide range of fertility relationships. Self fertility was relatively independent of combining ability (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 333 and Vol. XXI, Abst. 2733). There was hardly any correlation between self fertility and the forage yields of open-pollinated progeny, and only slight correlation between self fertility and S_1 progeny yields. In respect of forage yields, a significant correlation was found between vegetatively propagated clones and both their open-pollinated and S_1 progenies. Open-pollinated and S_1 progenies were of approximately equal value in indicating the breeding potentialities of parental clones.
The degree of relationship indicated by a correlation of + ·71 between self fertility and cross fertility suggests that genes influencing self fertility condition general fertility.
It is concluded that where high seed setting ability is desirable considerable self fertility may be of advantage.

1211. Mayer, R., Vincent, A. and Ecochard, R.
Les populations françaises de luzerne. Caractérisation—zones de culture—valeur culturale. (**The French populations of lucerne. Their description, areas of cultivation, and cultural value**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Sér. B : 210–55.

Introductory considerations on the cultivated lucernes and their botanical status and genetic origin are followed by a review of the lucerne populations in France, with notes on various characteristics of the flowers, pods, seeds, root system and stems, and on winter habit, earliness of flowering and cold resistance. A classification for the French populations is proposed and their distribution is outlined with notes on their crop value as determined by trials held in France in 1939 and 1946–49.

1212. Vengrenovskiĭ, S. I. and Sokolenko, N. F.
(**Improving the varietal properties of the lucerne variety Zaĭkevič**).
Agrobiologija (Agrobiology) 1951 : No. 4 : 15–19. [Russian].

Poltavskaja Zaĭkevič [Poltava Zaĭkevič] was improved at the Odessa Institute of Breeding and Genetics by open pollination and sowing for several generations upon good soil in summer. The initial land variety originated from and was cultivated at Poltava. At Odessa, it was open-pollinated with strains of the same variety grown in other districts of the USSR. The new variety, Odesskaja Zaĭkevič [Odessa Zaĭkevič], is productive and shows resistance to drought and low temperatures.

1213. Wheeler, W. A.
Beginning of hardy alfalfa in North America.
Seed World 1951 : **69** : No. 5 : 8–10 : No. 6 : 16–18.

This is the first of a series of articles on lucerne breeding, mainly with reference to hardiness, in which information drawn from early publications of the US Department of Agriculture and experiment stations in the northern states, and unpublished records of earlier work is surveyed, personal recollections of the author and other workers during the first period of lucerne breeding are given, and present day methods are compared with those during the earlier period.

1214. Canel, M.
Reacción de doce variedades de alfalfa ante la sequía producida artificialmente. (**Reaction of twelve lucerne varieties to artificial drought**).
IV Conf. Interamer. Agric. II Reun. Reg. Latinoamer. Agric. Aliment. 1950 : 103–04.

The Uruguayan variety Tivicata (*Medicago sativa* x *M. falcata*) proved the most resistant and the most vigorous in growth.

1215. **Caliverde, new alfalfa variety, released to California growers.**
Crops and Soils 1951 : **4** : No. 2 : p. 26.

Caliverde lucerne, developed at the University of California, combines resistance to bacterial wilt, leaf spot and mildew with the many desirable characteristics of Chilean lucerne.

1216. Smith, D.
Root branching of alfalfa varieties and strains.
Agron. J. 1951 : **43** : 573–75.

Differences in degree of branching and general development of roots are recorded between varieties of lucerne grown at Madison, Wis. The possibility of a correlation between drought resistance and root development is discussed.

1217. Hansen, J.
H. N. Frandsen, 70 Jahre alt. (**H. N. Frandsen's 70th birthday**).
Z. Pflanzenz. 1951 : **30** : p. 487.

Reference is made to H. N. Frandsen as the founder of the polycross method, his present use of polyploidy in clover breeding, and the first artificial production of *Brassica carinata*, *B. juncea* and *B. Napus* by crossing tetraploid forms of *B. nigra*, *B. oleracea* and *B. campestris*.

1218. Smith, P. E.
The inheritance of leaf marking in red clover (*Trifolium pratense* L.).
Abstr. Doct. Diss. Pa St. Coll. 1950 (1951) : **13** : 53–54.

Leaf markings were classified into basal, central and apical. The following hypotheses on the inheritance of markings are given: development of marking is dominant to nondevelopment and depends upon a single gene pair, *Mm*; the recessive factors *mm* are epistatic to the genes conditioning type of leaf marking; central and basal markings are controlled by the single pair *Mbmb*, central being dominant to basal; very close linkage exists between the genes for development of marking and those for type of marking, as shown by the linkage detected between *M* and *mb*; apical marking depends upon two dominant complementary genes, *A* and *T*; the recessive condition of either *A* or *T*, or of both these genes has no visible effect, or its influence is masked by the epistatic action of other genes; and lastly, apical marking is inherited independently of the central and basal types. Each type of marking showed variation in size and other characters; plants also varied according to the stage of growth at which markings were first visible. In addition, environment considerably influenced the expression of marking. Several populations resulting from sib matings segregated for albino seedlings; the character was lethal at the seedling stage and appeared to have simple inheritance; in one family however albino seedlings possibly arose through the action of at least three factor pairs.

1219. Wexelsen, H.
Lokalstammer av norsk rødkløver. (**Local strains of Norwegian red clover**).
Forskning Forsøk Landbruk., Oslo 1951 : **2** : 185–91.

When the Institute for Genetics and Plant Breeding at the Agricultural College of Norway began work on clover trials and breeding, the need for more exact information regarding the red clover strains in Norway became clear. As a result of questionnaires subsequently sent out to Norwegian seed growers it is now known that for seed production only Norwegian local strains are used. Many farms have old strains that have been maintained unmixed for from 10 to 90 years. A large number of such strains are now being studied at the Institute for Genetics and Plant Breeding.

1220. De Rycke
Le trèfle violet (*Trifolium pratense*). [**Red clover (*T. pratense*)**].
Courrier Hort., Bruxelles 1951 : **13** : 395–96.

Strains from Flanders, Campine, Brabant, Holland, the Ardennes, Normandy, Brittany, Bohemia, Silesia, Italy and the USA are briefly mentioned with notes on their resistance to cold, frost or drought, and their suitability for Belgian conditions.

1221. **New clover developed at Indiana Exp. Station.**
Crops and Soils 1951 : **4** : No. 2 : p. 25.

Purdue red clover, an improved synthetic strain capable of yielding two annual cuttings, possesses a high degree of resistance to northern anthracnose and some resistance to mildew.

1222. Cutler, G. H.
A new improved strain of little red clover.
Agron. J. 1951 : **43** : 572–73.

Methods used to select a new synthetic red clover strain from FC 15808 at the Purdue Agricultural Experiment Station, Lafayette, Ind., are described. The new strain, which is unnamed, is vigorous enough for two cuttings and has given high seed yields. It possesses outstanding resistance to northern anthracnose (*Kabatiella caulivora*) and some resistance to mildew. Seed is available for breeding purposes.

1223. Owen, C. R.
New Ladino-type clover S-1.
Sth. Seedsman 1951 : **14** : No. 10 : 26, 30, 68–69.

Louisiana S–1, a new white clover developed by intercrossing five clonal selections made from

native Louisiana strains, is to be released by the Baton Rouge Station, La. The variety shows a tendency towards perennation and is tolerant of adverse summer weather. In local trials it has produced more forage in a season than Ladino clover and equalled the seed yield of Louisiana white clover.

1224. VEAZEY, A. H.
New crotalaria holds seeds after ripening.
Crops and Soils 1951 : **4** : No. 2 : p. 25.
A mutant form of *Crotalaria spectabilis* with nondehiscent legumes, discovered on a farm at Carthage, NC, has bred true for this desirable character over several generations.

ROOTS AND TUBERS

1225. AGAPOV, S. P.
(A new variety of table beet, AO-474 Podzimnjaja).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 10 : 58–60. [Russian].
A productive nonbolting variety, AO–474 Podzimnjaja [AO–474 Late Autumn], was obtained at the Gribovo Vegetable Breeding Station by fourfold selection of élite seed of Bordeaux sown in late autumn. The variety showed resistance to bolting under conditions of the Archangel and Murmansk provinces.

1226. CULLEN, A. L.
Fodder beet.
J. Inst. Corn and Agric. Merchants 1951 : **3** : 42–48.
Varietal trials of the Barres type of mangels, fodder sugar beet and sugar beet for fodder, carried out in Essex (England), by T. Cullen and Sons during 1950, are reported. Descriptive notes are given on the 30 Swedish, Danish and Dutch varieties tested. Varieties of fodder sugar beet giving a high yield of satisfactorily concentrated dry matter per acre and showing ease of lifting are likely to be the most suitable for cultivation.

1227. HOSODA, T.
(On the size of the seed of interspecific and intergeneric crosses involving *Brassica*, *Sinapis* and *Raphanus*).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : 51–52. [Japanese].
Tables are given of the lengths of the long and short axes of the seeds in F_1 hybrids and their parents in a series of crosses involving species of *Brassica*, *Sinapis* and *Raphanus*.

1228. NISHIYAMA, I.
(A discovery of a new amphidiploid *Raphanobrassica*).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : 24–25. [Japanese].
An amphidiploid *Raphanus* x *Brassica* hybrid differing from that first described by Karpečenko in leaf, root and floral characteristics and in greater fertility is described. A list is given of combinations of Japanese *Raphanus* and *Brassica* varieties giving rise either to the old or to the new type.

1229. HOSODA, T.
(On the fertility of allopolyploid hybrids between the turnip and radish obtained by colchicine treatment).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : 52–53. [Japanese].
Allotetraploids in which the turnip acted as female parent were far less fertile than the reciprocal tetraploids or hexaploids.

1230. BECKER, T.
Siebenjährige blütenbiologische Studien an den Cruciferen *Brassica napus* L., *Brassica rapa* L., *Brassica oleracea* L., *Raphanus* L. und *Sinapis* L. **(Seven years' study of floral biology in the Cruciferae *B. napus* L., *B. rapa* L., *Raphanus* L. and *Sinapis* L.).**
Z. Pflanzenz. 1951 : **31** : 72–103.
Higher sets from self and cross pollination were obtained from plants grown in a large unheated greenhouse, where flowering began in April and no bagging was necessary, than in the open. Marked inbreeding depression, expressed as a reduction of seed set, was observed on selfing all forms of *B. Rapa* but not in *B. Napus* and *Raphanus*. The sterility normally associated with crosses of *B. Rapa* x *B. Napus* was also absent; the increased fertility was ascribed to the low temperature, and the fact that all pollinations were carried out on young buds; the reciprocal cross gave equal seed sets under these conditions, so that it was not necessary to use the species with the higher chromosome number as seed parent. In crosses of *B. Rapa* x *B. oleracea* only a few misshapen seeds occurred and the reciprocal was absolutely sterile, as was the cross *B. oleracea* x *B. Napus*. Plants of two turnip varieties, Teutoburger and Bortfelder (*B. Rapa* var. *rapifera*), planted in a field of rape (*B. Napus* var. *oleifera*), contained 30 and 35% of hybrids in their respective progenies; plants grown at a distance of 10 m.

from the rape had 1·4 to 5·3% of hybrids and plants at 100 m. about 1%. The hybrid nature of the plants classed morphologically as hybrids was confirmed by pollen examinations. Pollination of the variety Teutoburger with a mixture of pollen from Teutoburger and rape produced no hybrid plants, whereas in a similar experiment with Bortfelder the rape pollen was preferred. In the reciprocal experiments there was no hybridization; nor was there in experiments using mixtures of rape and cabbage pollen, and in preliminary experiments with mixtures of pollen from different varieties within a species there was no sign of preference for either self or cross pollen. The results on outpollination make it clear that in practice there is no fear of cross pollination between *B. oleracea* and *B. Rapa*, but with *B. oleracea* and *B. Napus* the danger is somewhat higher. The different forms of *B. oleracea* cross readily one with the other and strict spatial isolation is therefore necessary. Some alterations in the regulations for spatial isolation of *Brassica* crops are suggested.

Some of the hybrids between different forms of *B. oleracea*, such as cabbage x kale and garden cabbage x kohl rabi, are of interest for use as either vegetables or stock feed and are described.

Observations on *Raphanus sativus* showed that much higher seed sets are obtained by interpollinating neighbouring plants than by pollination within a single flower. Again better sets were obtained when pollination was carried out at low temperatures. Crossed with turnip, radish gave no set, with rape a few inviable seeds; a large vigorous plant was obtained from a radish x kohl rabi cross but it formed no flowers. Crosses of *R. sativus* var. *niger* x *R. sativus* var. *radicula* gave higher sets than the reciprocal. Little or no deleterious effect from inbreeding was observed in *R. sativus* var. *niger*. A number of hybrids between this form and var. *radicula* were produced and are described; the segregation ratios for root colour in the F_2 of some of the hybrids are presented and confirm those of Tatebe (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 867). Crosses between cultivated and wild radish were also made easily, and great attention must be given to this species in isolation work.

Three seeds were obtained from pollination of Saxa radish with red cabbage, giving rise to three vigorous plants, which however, in spite of treatment with colchicine and with low temperature, failed to form seed. Crosses of *Raphanus* with *Sinapis* and with *B. chinensis* failed to produce seed; radish x cauliflower gave a few seeds and radish x Dauerrot red cabbage gave seeds though the reciprocal did not.

1231. Manner, R.
Original Patria Wilhelmsburger. (**Patria Wilhelmsburger**).
Medd. Gullåkers VäxtförädlAnst., Hammenhög 1951 : Nos. 7–8 : 180–86.

This new strain of swede, Patria Wilhelmsburger, bred at the Plant Breeding Station, Gullåker, Sweden, has green-topped roots with yellow flesh and a high content of dry matter. The yield of roots and the yield of dry matter per unit of area are also high and the roots keep well in storage. Yields from the Gullåker trials in Skåne and on the Ullevi estate and from trials held by the Skåne Seed Production Association show the good performance of Patria Wilhelmsburger in competition with other Swedish varieties and the Danish swede Wibolt VIII and a Danish strain of the Wilhelmsburg type.

1232. Kawakami, K.
(**Conspectus of investigations on the potato in various foreign countries. 5**).
Nogyo Engei (Agric. Hort.) 1949 : **24** : 685–89. [Japanese].

This general review of research on the potato in Germany and France includes references to breeding projects.

1233. Schick, R. and Jacob, E.
Der Wiederaufbau der Kartoffelzüchtung in der DDR nach 1945. (**Building ing up potato breeding again in the DDR after 1945**).
Züchter 1951 : **21** : 211–22.

Tables and notes are given showing the distribution of potato varieties in different parts of the Russian Zone of Germany (DDR) with some statistical and other information on quality, the production of healthy stocks, earliness, diseases and disease resistance.

1234. **Agricultural Research Council: Potato Genetics Station.**
Nature, Lond. 1951 : **168** : 681–82.

The Commonwealth Potato Collection, Cambridge, has been transferred from the control of the Commonwealth Agricultural Bureaux to that of the Agricultural Research Council and is now to be known as the Potato Genetics Station. Its activities are briefly described (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1953).

1235. Parker, M. M.
The white potato breeding program in eastern Virginia and the technique used in developing new varieties.
Va. J. Sci. 1951 : **2** : p. 300. (Abst.).
Methods of hybridization and selection are outlined.

1236. **Twenty-second Annual Report of the Executive Council 1950-51. Appendix IV. Commonwealth Potato Collection.**
Commonwealth Agricultural Bureaux 1951 : 32–34.

The collection is being reorganized so that it may become a working collection for genetical research. The use of *S. demissum* as female parent in crosses with cultivated and wild diploids is receiving attention. Resistance to late blight and immunity from virus Y are being studied in the tetraploid hybrids. Genetical analysis of cultivated diploids, especially *S. Rybinii*, is in progress.
Tests of resistance to virus, late and early blight continued. A high degree of intolerance of virus Y occurs relatively frequently in the series *Cardiophylla*, *Commersoniana* and *Longipedicellata*; immune clones occur in these series and also in *Pinnatisecta*. Out of 850 clones of *S. tuberosum* subsp. *andigenum*, 30 have shown intolerance. A high degree of resistance exists in certain clones of *S. Rybinii;* this appears to be a property distinct from intolerance.
Six pathogenicity groups of *Phytophthora infestans* have been differentiated. Species containing one or more clones resistant to A, B and C groups of the fungus are listed.
S. saltense CPC 51b and *S. toralapanum* CPC 1773 have maintained a high degree of resistance to *Alternaria Solani*. In preliminary tests, *S. bulbocastanum* CPC 2239 was highly resistant.

1237. Nazarenko, E. P.
(New developments in the technique of vegetative hybridization of the potato).
Agrobiologija (Agrobiology) 1951 : No. **3** : 136–39. [Russian].

The grafting methods used at the Potato Research Station, Eljnja, Smolensk province, are described. A promising vegetative hybrid, 1p/48, has been obtained by grafting an F_1 seedling 1035c/47 from Lorh x *Solanum demissum* on Stärkeragis. The hybrid yielded more tubers and more starch per plant than Stärkeragis, although the starch content in its tubers was not so high as in the tubers of Stärkeragis. The vegetative hybrid is earlier than the initial varieties and shows resistance to *Phytophthora*. The changes in the hybrid occurred only when the leaves of the scion and the lateral shoots of the stock were removed.

1238. Zitzewitz, A. v.
Die Steigerung des Stärkegehaltes durch Züchtung. (**Raising starch content by breeding**).
Kartoffelbau, Hamburg 1951 : **2** : 217–18.

Past experience has shown that it is possible to breed mid-early potatoes with up to 22% starch content, and late forms with over 28%, that the utilization of varieties with these high starch contents presents no insuperable technical difficulties, either for starch or alcohol production, and that no loss in starch yield per unit area need result from their cultivation.

1239. Cellier, K. M. and Edwards, G. R.
A potato uniformity trial.
J. Dep. Agric. S. Aust. 1951 : **55** : 89–90.
Results of trials with Exton in the Adelaide Hills, South Australia, show that the optimum plot arrangement, consisting of 2 rows of 16 plants each, gives a coefficient of variability of 10%.

1240. Pohjakallio, O.
Potatisens resistensfrågor. (**Problems of resistance of the potato**).
Nord. JordbrForskn. 1951 : **31-32** : 486–93.

In 1930 experiments on the breeding of blight and frost resistant potatoes by crossing wild and cultivated species were begun at the Tammisto and Jokioinen research institutes in Finland. The present paper gives an account of the crosses carried out with *Solanum demissum* and *S. tuberosum* at the Vik Experimental Farm by the Phytopathological Institute of Helsinki. The tubers of *S. demissum* and of the F_1 clones 570/3 (Tammisto Early x *S. demissum*) and 556/2 (*S. demissum* x Rosafolia) showed scarcely any signs of blight, and it should be possible to obtain F_1 clones with practically complete resistance to both leaf and tuber blight.
Late summer frosts of –3·5° C and –5° C damaged the foliage of cultivated potato varieties seriously, whereas the highest yielding F_1 clone Tammisto x *S. demissum* and the F_1 from *S. demissum* x Rosafolia, which was the most frost resistant, showed only slight damage; but all the F_1 clones were more frost sensitive than *S.*

demissum. Little difference was observed in the cold resistance of the tubers of cultivated potatoes, *S. demissum*, and hybrids between them. The physiological cause of the difficulty in combining cold resistance of the haulms with high tuber yield is briefly considered and it is suggested that varieties with this required combination could probably be produced for particular districts of Finland, though not for the whole country.

1241. Zvereva, P. A.
(New hybrids of potato able to withstand frost).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 35–37. [Russian].

Hybrids were obtained between *Solanum Schreiteri*, a variety of *S. acaule* and several varieties of *S. tuberosum* by means of vegetative rapprochement. Among the characters of G–2, the resulting hybrid, which resembled those of Epicure, were resistance to frost, large tuber size and heavy yielding capacity. The hybrid was tested in various environments, and found to withstand a temperature of –6·5° C. Hybrids of G–2 were shown to possess enhanced powers of resistance to disease, and exceeded several standard varieties in respect of yield, starch content and earliness of maturing.

1242. Mihaĭlova, V. N. and Česnokov, N. S.
(Wilting of potato in the south and control measures against it).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 5 : 19–26. [Russian].

Notes on breeding for resistance to a disease frequently occurring in southern Russia, which has been studied at the Rostov Potato Research Breeding Station, are included. It has been found that the disease is primarily caused by drought effects and that the condition of the diseased potato plants is aggravated, at a later stage, by infection with *Fusarium*.
Resistance to the disease is associated with vigorous root systems characteristic of such varieties as Wohltmann. Some individuals showing resistance may be found in varieties normally susceptible to the disease. Several clones showing resistance to wilting have been selected from Courier, Early Rose and Lorh.
The wild potatoes, *Solanum Jamesii*, *S. Schickii*, *S. gibberulosum*, *S. laplaticum* and *S. catarthrum*, and the domestic varieties Courier, Early Rose, Ella, Uljjanovskiĭ [Uljjanov] and Houma are recommended as material for breeding resistant varieties.

1243. Zvereva, P. A.
(Hardy varieties of potato).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 6 : 15–17. [Russian].

Breeding potatoes for hardiness at the Institute of Arctic Agriculture is reported. Vegetative hybridization was used to overcome incompatibility between the hardy *Solanum Schreiteri* and *S. tuberosum*. The method consisted of grafting young seedlings of the wild species on vigorous stocks of older plants of *S. tuberosum*. The effect of the stock was intensified by repeating the grafting operation, using seedlings obtained from selfing in the first year as scions in the second operation.
Some productive and hardy material has been obtained from crosses between these vegetative hybrids and *S. tuberosum* varieties, the latter as male parents. The F_1 included 141–5, a hybrid from (*S. Schreiteri* grafted on Smyslovskiĭ [Fürstenkrone]) x Smyslovskiĭ, and G–2 and G–3, both from the cross between the same vegetative hybrid as above and Epicure. Hybrid 141–5 shows promise as a new variety, being hardy and productive, with tubers containing 18% starch. G–2 and 141–5 cross readily, when used as female parents, with domestic varieties, the progenies derived from G–2 being productive and hardy.
In trials at Uljjanovsk, some of these hybrids appreciably outyielded the standard Lorh; they also produced a higher percentage of well-shaped tubers than Lorh, Early Rose or Wohltmann, and had a higher starch content than the last named variety. Many hybrids proved very hardy in trials conducted in or near the arctic circle and some of them transmitted this character to their less hardy components in direct and reciprocal grafts. Hybrid 2–7 was the most productive, yielding 17% more tubers than the standard Šestinedeljnyĭ [Six Weeks]. Other hybrids were also remarkable for high yields, uniform large tubers and high starch content. Hybrid 2–7 gave also a good account of itself in trials at Puškin, where it outyielded Berlichingen and produced tubers with a higher starch content; it is a mid-early variety in the northern districts but is earlier than Early Rose when cultivated in the south of the USSR; preliminary tests suggest that hybrid 2–7 shows resistance to wart.

1244. Stapp, C.
Fortgeführte Untersuchungen über die Widerstandsfähigkeit deutscher Kartoffelsorten gegen den bakteriellen Erreger der Schwarzbeinigkeit und Knollennassfäule. (Further investigations on the resistance of German potato varieties to the bacterial pathogen of black leg and watery tuber rot).
NachrBl. dtsch. PflSchDienst., Braunschweig 1951 : **3** : 185–87.

Tests of 22 new German varieties with *Bacterium phytophthorum* races 14 and 43 showed three of them, Biene [Bee], Immertreu [Ever True] and Toni, to be resistant. No correlation between resistance and flesh colour, time of maturity or healing capacity of the tubers was detected, though there were indications that early varieties were somewhat more susceptible than late. Race 43 has increased in virulence in comparison with race 14.
Of the older varieties tested, Voran continued to be resistant.

1245. Perkins, B. L.
Distribution, severity and control studies with *Corynebacterium sepedonicum* in several potato varieties.
Univ. Wyo. Publ. 1951 : **26** : 198–99. (Abst.).

Isolates of *C. sepedonicum* from Bliss Triumph, Red McClure, Burbank and Teton were used to inoculate each of the four varieties. Teton proved most resistant to all isolates, but bacteria from Teton induced the most severe symptoms on the three remaining varieties.

1246. Hooker, W. J. and Sherf, A. F.
Scab susceptibility and injury of potato tubers by 2,4,5-trichlorophenoxyacetates.
Amer. Potato J. 1951 : **28** : 675–81.

It has been reported by Wood and Ennis that spraying potato foliage with 2,4,5-trichlorophenoxyacetates increased the incidence of scab-like injury on the tubers; they therefore suggested that this growth regulator might be valuable in ensuring a rigorous test of scab reaction in breeding. The results of experiments carried out by the present authors however give no support to this suggestion.

1247. Ellison, J. H., Jacob, W. C. and Cunningham, H. S.
Effect of soil reaction on the performance of certain scab-resistant and susceptible potato varieties.
Amer. Potato J. 1951 : **28** : 721–27.

Scab resistant and susceptible varieties were grown on plots ranging from 4·3 to 7·6 in pH. Green Mountain, Irish Cobbler, Katahdin and Mohawk produced their largest yields of scab-free tubers over a pH range of 4·3 to 5·2 and yielded progressively fewer clean tubers with increased pH. Ontario exhibited a high degree of scab resistance, during all four years of the experiment, over the entire range of 4·3 to 7·6. Yampa, tested only in one year, gave good yields at all pH levels, except 7·6, at which point its yield decreased significantly.

1248. Castronovo, A.
Fuentes de resistencia a "*Phytophthora infestans*". **(Sources of resistance to *Ph. infestans*).**
Rev. Invest. Agríc. B. Aires 1950 : **4** : 245–75.

Tabular data are given showing the reaction of a large collection of potato varieties, domestic and wild, to artificial infection with two Argentine cultures of *Ph. infestans*. No Argentine wild species was resistant, even *Solanum chacoense* being entirely susceptible to one of the two cultures; *S. lanciforme* also proved susceptible and the Argentine biotypes are evidently distinct from those of most other countries. Most domestic varieties, including forms from southern Chile, and *S. andigenum* varieties proved susceptible, but seedlings 834c, 914a, S9b–28, CZK–7, DCR–1 and DHB–6 were resistant, together with "Aya papa" and certain forms of *S. demissum*, *S. semidemissum* and *S. verrucosum*.

1249. De Bruyn, H. L. G.
Pathogenic differentiation in *Phytophthora infestans* (Mont.) DeBary.
Phytopath. Z. 1951 : **18** : 339–59.

Within its original host, in culture and on commonly grown varieties of *Solanum tuberosum* at Wageningen, each of 12 isolates of *Ph. infestans* maintained stability in respect of racial characteristics. As a result of successive passages through numerous tomato varieties and new potato hybrids with varying reactions, the infective capacity of each isolate was altered; each became gradually adapted to new hosts. The impermanence of present races is thus emphasized; it is suggested, however, that each race may be characterized by the limits to its plasticity.

1250. **N.S.W. potato varieties praised in South Africa.**
Agric. Gaz. N.S.W. 1951 : **62** : p. 461.

The varieties Monak and Adina have given high yields in South African trials, and shown

resistance to *Alternaria Solani* and *Phytophthora infestans.*

1251. **New potato varieties released.**
Amer. Potato J. 1951 : **28** : 697–99.

The late blight resistant varieties Canso and Keswick, developed at the Dominion Experimental Station, Fredericton, NB, are described in detail (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1152). Canso was bred by crossing *Solanum demissum* and Earlaine, and repeatedly back-crossing with Katahdin. Keswick was produced from a cross between *S. demissum* and Earlaine, back-crossed with Earlaine and finally with Green Mountain. Both varieties are field immune from *Solanum* virus 4 (virus B). Canso possesses some field resistance to virus 1 (X); Keswick is susceptible to this virus. Both varieties are susceptible to virus 2 (Y), leaf roll, bunch top and insects. Neither variety requires fungicidal protection against late blight under average epidemic conditions. Canso is late maturing, Keswick medium late. In New Brunswick, Canso has equalled Katahdin in yielding ability and Green Mountain in cooking quality. Keswick has equalled or surpassed other varieties in yield when harvested early; as a main crop it has equalled Green Mountain in both yield and cooking quality.

1252. Veselovskiĭ, I. A. and Jazovskih, T. A.
(The extension of potato cultivation to the subtropical zone of the USSR).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. **11** : 69–70. [Russian].

Agrobiological experiments with several potato varieties in the Soviet humid subtropics are reported. Reference is made to the late variety Vale showing a high degree of resistance to *Phytophthora.*

1253. Müller, K. O. and Munro, J.
The reaction of virus-infected potato plants to *Phytophthora infestans.*
Ann. Appl. Biol. 1951 : **38** : 765–73.

The growth of *Ph. infestans* was retarded on leaves of seven varieties of potato previously inoculated with several strains of virus X or Y; the more severe the symptoms of virus infection, the greater was the effect on the development of *Ph. infestans.* These results emphasize the importance of using virus-free material when conducting varietal trials for blight resistance.

1254. Hey, A.
Untersuchungen über die Anfälligkeit von Kartoffelsorten gegen den Krebsbiotyp G. **(Investigations on the susceptibility of potato varieties to wart biotype G).**
NachrBl. dtsch. PflSchDienst., Berlin 1951 : **5** : 226–30.

The only varieties that proved fully resistant when grown in a field infected by biotype G of *Synchytrium endobioticum* were Fram, Frühe Hörnchen and Hilla. The degree of resistance to the G biotype cannot always be judged by reaction to the common strain, though varieties completely susceptible to the latter were invariably attacked by strain G.
A number of promising high-yielding breeding lines also proved resistant to biotype G.

1255. Potlaĭčuk, V. I.
(Biological specialization of the organism causing wart in potato).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 36–39. [Russian].

It is shown that the degree of susceptibility to wart of wild potato species depends on the origin of the wart race. *Solanum Schickii, S. Schreiteri* and *S. tuberosum* f. *monticum* were susceptible to infection by races isolated in the Leningrad province while showing resistance to a race originating from Minsk. *S. andigenum* var. *Tcomera,* on the other hand, proved resistant to the Leningrad races and susceptible to the race from Minsk. *S. Antipoviczii* showed susceptibility to all the above races but infection with the Minsk race occurred earlier.

1256. Hofferbert, W. and Orth, H.
Unsere Arbeiten zur *Rhizoctonia*-Frage bei der Kartoffel. I. Gibt es für den Züchter Möglichkeiten, der *Rhizoctonia* methodisch zu begegnen? **(Our work on the *Rhizoctonia* question with reference to the potato. I. Are there any possibilities of the breeder countering *Rhizoctonia* by some systematic procedure ?)**
Z. PflKrankh. 1951 : **58** : 245–56.

Investigations in Germany have shown that varietal differences in resistance to *Rh. Solani* exist. A test collection has been formed for testing new breeding material. Resistant varieties may, it is suggested, be recognized by marked regeneration capacity and strong root formation.

1257. Hutton, E. M. and Peak, J. W.
Some strains of potato virus X and their spontaneous mutation.
Aust. J. Sci. Res. 1951 : **4** : 223–30.

Spontaneous virulent mutants arose from three avirulent strains of potato virus X cultured in *Datura Stramonium*; the mutants from the three strains were similar; they also resembled the ordinary virulent control strain. The mutants almost entirely suppressed the parental avirulent strains. No evidence of back mutation was obtained. Possibly in evolution avirulent strains precede virulent ones; thus avirulent strains would remain unnoticed in a host until transferred to a plant favourable for their mutation.

1258. Bercks, R.
Weitere Untersuchungen zur Frage der Altersresistenz der Kartoffelpflanzen gegen das X-Virus. (**Further investigations on the question of resistance to virus X due to age of the potato plant**).
Phytopath. Z. 1951 : **18** : 249–69.

Test infections of the potato varieties Flava and Capella with virus X strains from different varieties of potatoes corroborated previous evidence of resistance due to age in the case of other strains of the virus (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2409). It also appeared that Flava and Capella react differently to early infection and that Flava can be infected by virus X strains from Erstling, Direktor Johanssen and Kaiserkrone, whereas Capella cannot.
The role of nutrition in regard to incidence of infection and the possible cause of resistance due to age are briefly discussed.

1259. Darby, J. F., Larson, R. H. and Walker, J. C.
Variation in virulence and properties of potato virus Y strains.
Res. Bull. Wis. Agric. Exp. Sta. 1951 : No. 177 : Pp. 32.

The relative virulence of 18 virus Y isolates from widely scattered parts of the United States and Great Britain was estimated by inoculating 22 potato varieties at temperatures ranging from 16 to 28° C. Certain isolates produced similar symptoms on different varieties. These isolates were classified as mild, medium or severe strains; but isolate 7, severe on most varieties, produced only mild symptoms on Snow Drift, and isolate 18, generally a mild strain, induced severe symptoms on Snow Drift. However, Arran Banner and Snow Drift showed the greatest average tolerance of virus Y strains. Tobacco inoculated with isolates of virus Y in combination with three virus X isolates, X^H, X^D and X^{RS}, developed mild spot necrosis, moderate spot necrosis and severe spot necrosis respectively; X^{RS} was most sensitive for detecting the presence of Y, but X^H readily revealed differences between the 18 isolates.

1260. Rich, A. E.
Studies on phloem necrosis of Irish potato tubers in Washington.
Bull. Wash. Agric. Exp. Sta. 1951 : No. 528 : Pp. 49.

During 1948 and 1949, varietal differences were noted in the tendency to develop phloem necrosis when exposed to aphids carrying the leaf roll virus. Katahdin, Calrose, Glenmeer, Placid, White Rose and X 1276–185 proved resistant in both years, and also showed some tolerance of leaf roll infection.

1261. Hutton, E. M.
Possible genotypes conditioning virus resistance in the potato and tomato.
J. Aust. Inst. Agric. Sci. 1951 : **17** : 132–38.

Methods of detecting the presence of genes for resistance and developing resistant varieties are reviewed with reference to the potato and tomato.

1262. Lunden, A. P.
Virussykdommer på potet. Virkningen av virus X (*Solanum* virus 1) på avkastningsevne, tørrstoffinnhold, m.m. og bekjempelsen av dette virus gjennom oppformering av virusfrie stammer og gjennom foredlingsarbeidet. [**Virus diseases in the potato. The effect of virus X (*Solanum* virus 1) on yield, dry matter content, etc., and the control of this virus by producing new virus-free strains and by breeding**).
Forskning Forsøk Landbruk., Oslo 1951 : **2** : 140–56.

Previous investigators' work is recorded on the prevalence of virus X in various countries, on the mode of transmission, on the different strains known to exist, and research at the Agricultural College of Norway on the yield from X-infected and X-free plants is illustrated by special reference to three years' experiments on the effects in 1948–50 of a weak strain upon stocks of the Norwegian variety Ås. The tabulated results for Ås show that the average loss in yield of tubers was 11% (14% in

1950) and the ascorbic acid content was also decreased.
In citing results by other breeders, the author records his own investigation on inheritance of the top necrosis type of resistance in 100 plants of Epicure x Frühmölle. The results, though inconclusive, show that the reaction is heritable and probably dominant and can be combined with other characters, such as immunity to wart.

1263. Culbertson, R. E. and Boulware, J. H.
Sweet potatoes in Japan.
Rep. Natural Resources Sect. Gen. Hdqrs Allied Powers, Japan 1951 : No. 145 : Pp. 63. (Mimeographed).
This publication on the cultivation and utilization of the sweet potato includes an account of types and varieties and of breeding methods in Japan. Continued work on the development of high yielding varieties possessing superior culinary quality and disease resistance is recommended.

1264. Cooley, J. S.
The sweet potato—its origin and primitive storage practices.
Econ. Bot. 1951 : **5** : 378–86.
Literature concerning the origin of *Ipomoea Batatas* is reviewed.

1265. Montelaro, J. and Miller, J. C.
A study of some factors affecting seed setting in the sweet potato.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 329–34.
Compatibility relationships of Unit I Porto Rico and four numbered seedlings with desirable fruit qualities have been tested at the Louisiana Experiment Station. In controlled cross pollinations and open pollinations all five lines functioned equally well as pollinators. Seedlings 201 and 241 were poor female parents; their low fruit-setting capacity appears to be unrelated to environmental conditions. The percentage seed set from selfed flowers was lower in each line than the corresponding set from cross pollinations, indicating a degree of self incompatibility.

1266. Sekinai, O. and Haramoto, S.
(Suberization and storage period in the sweet potato).
Nogyo Engei (Agric. Hort.) 1949 : **24** : p. 690. [Japanese].
Data are provided on the degree of suberization and the incidence of storage rots among Japanese sweet potato varieties.

1267. B., P. I.
Introduction of new plants.
Indian Fmg. 1951 : **11** : 586–87.
A brief account is given of adaptability trials, with cereal, forage and vegetable introductions, undertaken at the Indian Agricultural Research Institute, New Delhi, since 1946. The outstanding performances of a sweet potato from China, referred to as Tie-Shin-Tun, and an early maturing cowpea from the Philippines indicate the value of such trials.

1268. Yoshii, H.
(Studies on the resistance of the sweet potato to *Macrosporium bataticola*. I.).
Sci. Rep. Matsuyama Agric. Coll. 1950 : No. 5 : 55–75. [Japanese].
Varieties of sweet potato differ in their susceptibility to *M. bataticola*. The relative resistance of Norin 1 [Ministry of Agriculture and Forestry 1] is correlated with a high concentration of an acetone-soluble substance.

1269. **Fabulous new varieties fail to displace old favorites.**
Sweet Potato J. 1951 : **6** : No. 4 : 3–11.
Varietal trials of sweet potato for the table and for starch production, carried out at the Georgia Coastal Plain Experiment Station over five years, are summarized.
The results of an investigation of breeding techniques indicate that the most effective time for emasculating is late afternoon; pollination is generally successful if carried out from 7 to 9 the following morning.
Dubose (PI 153655), a stem rot resistant introduction from the Tinian Islands (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1906), transmits resistance to its F_1 progeny when crossed with commercially acceptable varieties; it has therefore been included in the breeding programme.

FIBRES

1270. **Twenty-eighth Annual Report of the Indian Central Cotton Committee for the year ended 31st August, 1949** : Pp. 90.
Fundamental genetical research carried out at the Institute of Plant Industry, Indore (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1677), and investigations on methods of testing breeding material undertaken at the Committee's Technological Laboratory (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1996) are reviewed. Detailed

reports of improvement work in the provinces and states are summarized below.

Bombay. Selections with promising wilt resistance have been tested at Poona and Jalgaon (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2424). High lint yields produced by selections from HS 98 and HS 72 exceeded those of BC 1–2. Several lines from back crosses of 1027 ALF with BC 1–2 and BC 1–6 have shown higher ginning percentage and longer staple than BC 1–2. Early maturing lines have been selected for hybridization with commercial varieties.

At Khandesh, secondary selections with improved yield and staple length were made from 197–3 and Jarila. Progenies from crosses of 197–3 with NR 5, Jarila and 9–2–8–3–3 are being analysed.

A wilt resistant variety, 3652, has shown adaptation to the Surat tract. Attempts are being made to improve its short staple by crossing with 1027 ALF.

The new strain of Dharwar-American cotton, known as 9–3, has been named Laxmi. It is recommended to growers in place of Gadag I. Meanwhile, Laxmi is being crossed with other commercially desirable cottons such as Kampala, Perso-American, M 4 and Co. 2, 3 and 4.

Hybrids involving Pratap, a selection from the local Mathio cotton grown at Amreli, have outyielded Mathio selections developed at Jalgaon; C 520 x Pratap and Pratap x (C 520 x Pratap) are to undergo further trials.

East Punjab. Two American strains, AC 101 and AC 102, have higher yielding capacity and ginning percentage than Hariana (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2424). The latter is being crossed with indigenous and exotic American cottons possessing long lint.

Several lines of American cotton developed in the Punjab during the prepartition period have shown adaptability to the submontane region. Varieties 320 F, J 2 and 216 F are particularly suitable for replacing the short-stapled local strains.

Madhya Pradesh. Numerous desi and American strains are being tested for adaptability to the Akola and Amraoti districts.

Madras. The American varieties 4274 and 4285 equalled 881 F in staple length and ginning percentage, and gave superior yields (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2424).

Improved staple length, spinning capacity, ginning outturn and lint colour are combined in the Cocanadas variety 336 B. Hybrids 2540 and 2545, and the pure line 336 C 2, are also superior to Cocanadas 1 in respect of lint colour, staple length and ginning percentage.

Both 881 F and 197–3 are recommended for the Chinnapati area.

Increased staple length has been obtained in Cambodia selections made from MA II, HA 11 and BC 134.

Uttar Pradesh. Hybrids combining the earliness, yield and ginning qualities of C 520 with superior fibre characteristics of Jarila, Verum, Bani and Gaorani cottons have been obtained.

Assam. Several strains from the Garo, Mikir and Naga Hills were selected to form the basis of a breeding programme to improve local hill cotton.

Hyderabad. Improved strains of Gaorani 12F–2, Gaorani 6E–3 and Gaorani 6 have been selected with superior spinning qualities and greater resistance to *Fusarium* wilt than the parent varieties.

Mysore. Some newly introduced Egyptian and Anglo-Egyptian Sudan varieties tested for adaptation to local conditions have equalled yields from Giza 12 and Maarad. Hybrids were obtained from Egyptian and Sea Island cottons crossed with MA 5, Co. 4 and MA II.

Madhya Bharat. Two desi strains, Malvi 10 and Malvi 12, proved superior to the control variety, Malvi 9, in trials for cottons suited to the Malwa area. Several promising selections were made from progenies of Malvi 9 crossed with Jarila, Verum and Bani. Indore 3, a selection from Buri 107 x Co. 2, has outyielded MU 4 and Dhar Cambodia at Badnawar.

1271. **Growing winter crop in Mexico cuts time for cotton breeding work.**
Crops and Soils 1951 : **4** : No. 1 : p. 27.

By the newly introduced practice of growing two cotton crops a year, one in Mexico and the other in the USA, new strains should become available three or four years earlier than was formerly possible.

1272. Katayama, Y. and Isawo, F.
(On the new upland cotton varieties Kinshu 1 and Kinshu 2).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : 72–77. [Japanese].

Kinshu 1 (Kanno 1 x Gooch) is a new variety suitable for the upland cotton zone of Manchuria; it is five days earlier than Kanno 7 and has a higher ginning percentage. Kinshu 2 (Kanno 1 x Acala) matures at the same time as Kanno 1 but has a higher ginning percentage.

1273. Jones, J. E. and Loden, H. D.
Heterosis and combining ability in upland cotton.
Agron. J. 1951 : **43** : 514–16.

Nine commercial varieties were crossed with DeRidder Red Leaf. Heterosis was observed

for yield of seed cotton, percentage of total yield harvested at first picking and boll size. No heterotic effect was found for lint percentage, staple length, node number or height of first fruiting node from the ground. The varieties differed considerably in combining ability, the yield ranging from 0·8% over the better parent in Pandora x DeRidder Red Leaf to 47% in Stoneville 2B x DeRidder Red Leaf.

1274. Loden, H. D. and Richmond, T. R.
Hybrid vigor in cotton—cytogenetic aspects and practical applications.
Econ. Bot. 1951 : **5** : 387–408.

Data on heterosis resulting from interspecific, intervarietal and intravarietal crosses within the genus *Gossypium* are reviewed. The relative advantages of hand pollination, natural cross pollination and the use of male sterile or partially male sterile strains for the production of hybrid seed are discussed.

1275. Sen, D. L.
Technological reports on standard Indian cottons, 1950.
Technol. Bull. Indian Cent. Cott. Comm. 1951 : Ser. A : No. 76 : Pp. 87.

The report follows the plan of previous ones (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 70) and provides the results of fibre, yarn and spinning tests on samples of standard Indian cotton varieties for the 1949–50 and previous seasons.

1276. **New cotton developed at New Mexico Station.**
Crops and Soils 1951 : **4** : No. 1 : p. 31.

Unusually high yields have been produced by 1517 C during three years' trials. It has proved superior to 1517 A and 1517 B in respect of percentage lint, boll weight and lint index; its fibre strength is 2000 lbs./in.^{2} greater than that of 1517 B.

1277. Chevalier, A.
Les cotonniers de l'Oubangui, du Chari et du Tchad en 1902–1903. (**The cottons of the Oubangui, Chari and Chad districts in 1902-03**).
Rev. Bot. Appl. 1951 : **31** : 535–37.

The writer records the disappearance of semi-wild cotton varieties and species formerly found in the above mentioned regions. In French West Africa, specimens of all the old species, *Gossypium herbaceum* var. *acerifolium*, *G. arboreum* and *G. punctatum*, are still to be found here and there in the villages.

1278. Peters, R. W.
The cotton varietal position in Queensland.
Qd. Agric. J. 1951 : **73** : 187–96.

The general characteristics of the four main cotton varieties, Miller, New Mexico Acala, Lonestar and Triumph, are described. Numerous introductions of *Gossypium hirsutum* are undergoing trial for adaptation to particular environments, and selection of improved strains continues.

1279. Bird, L. S. and Blank, L. M.
Breeding strains of cotton resistant to bacterial blight.
Bull. Tex. Agric. Exp. Sta. 1951 : No. 736 : Pp. 25.

Studies made in Texas of the variability in pathogenicity of isolates of *Xanthomonas malvacearum* from different parts of the cotton belt gave no evidence that races or strains existed. Stoneville 20 proved resistant to all isolates. Deltapine showed a higher degree of tolerance than Stoneville 2B and Acala; it is assumed that the three susceptible varieties possess different numbers of minor genes for resistance. Analyses of F_2 progenies from crosses of Stoneville 20 with Deltapine and Acala showed that the degree of blight resistance was higher in Deltapine offspring than in Acala progenies although both inherited the same major genes for resistance from Stoneville 20. This indicates that minor genes influence the degree of resistance produced by major genes.
A modified back-crossing method for combining the blight resistance of Stoneville 20 with the desirable characteristics of commercial cotton varieties is outlined; several selections from material of which Stoneville 2B, Empire and Deltapine were recurrent back cross parents are comparable with commercial varieties.

1280. Brown, C. H.
Earliness.
Emp. Cott. Gr. Rev. 1951 : **28** : 253–55.

The relative advantages of earliness in different cotton varieties, with respect to production of flowers, time of maximum flowering, date of boll maturity and proportion of the first picking to total yield, are discussed with reference to the degree of damage caused by insect pests prevalent in Egypt. Giza 60 (Ashmuni x Menufi) has proved early in respect of each of the above criteria.

1281. Carvalho, M. de
Resultados da experimentação algodoeira em Moçambique (1942/43 a 1945/46). Análise estatística e redacção. [**Results of cotton experiments in Moçambique (1942/43 to 1945/46). Statistical analysis and interpretation**].
Agron. Lusitana 1949 : **11** : 249–375.

After a full description of the climatic and other conditions of the various zones in which the experiments were carried out, the results of experiments on sowing dates are presented, followed by those on variety tests in a number of different regions. In the Niassa area the highest yields were given by U4 but its fibre length and lint percentage were lower than those of variety 6250; the lint length was variable however and could probably be improved by selection. In other areas north of the Save river 6250 also proved the best variety, while south of the river 5149 is recommended.

1282. Plonka, F.
Comportement génétique de quelques caractères de la fleur et des graines chez le lin. (**Genetic behaviour of some characters of the flower and seeds in flax**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Sér. B : 155–78.

Based on the writer's own observations from crosses with 49 varieties and strains of flax from various countries and on the findings of other investigators, a critical account is given of the genetic basis of (i) coloration of petals, stamens and styles; (ii) sterility of the flower and (iii) colour and size of seed.

The writer has established that the allelomorph *c*, which when homozygous conditions a white flower with blue anthers, also determines white filaments and white styles, even when heterozygous. The action of the same mutant *c* seems to be the cause of a deficit of *BcD* ovules in F_2. A similar deficit of *bCD* macrospores in the F_2 is attributed to sterility caused by the action of the mutant allelomorph *b*.

Mottling of the seed, as found in Stormont Motley or Safi line 2, is probably due to one recessive factor, but, in the presence of *D*, inhibiting genes prevent the manifestation of variegation.

Heterosis was apparent in regard to seed size which is probably multifactorially conditioned.

1283. Kuckuck, H. and Levan, A.
Vergleichende Untersuchungen an diploiden und tetraploiden Leinsippen und an tetraploiden Kreuzungsnachkommenschaften nach vieljähriger Selektion. (**Comparative investigations on diploid and tetraploid flax races and on tetraploid hybrid progeny after many years' selection**).
Züchter 1951 : **21** : 195–205.

This comparative study was carried out by the Chromosome Laboratory of the Swedish Seed Association on diploid and tetraploid forms of the varieties Herkules, Concurrent, O 41, Blenda, Szekacs and Palermo. As compared with the diploids, all the 4*x* races had a higher 1000 seed weight, but a lower fertility, while in regard to length of stem, capsule number and seed yield, races varied, some being superior to the diploids and others inferior.

Strains from various crosses of tetraploid races showed marked transgressive segregation for the above mentioned characters except fertility.

Possible causes of the differences between diploid and tetraploid races and of the genotypic changes that occur during a long period of selection are discussed.

1284. Crozier, M. N.
Microscopic examination of the sectioned stem of linen flax (*Linum usitatissimum*). Part I. Microscopic analysis as a means of predetermining yield of scutched fibre. Part II. Examination of quality factors and their correlation with commercial grading.
N.Z. J. Sci. Tech. 1950 : **31** : Sect. A : No. 6 : 17–30.

A method for microscopic analysis of stem cross sections as a means of estimating quality and yield of extractable fibre is described. It should prove useful in connexion with breeding and selection.

1285. Flor, H. H.
Genes for resistance to rust in Victory flax.
Agron. J. 1951 : **43** : 527–31.

Victory flax, showing a high degree of resistance to *Melampsora Lini* when first grown in North Dakota, has since proved heterozygous for rust resistance. Some 18 selected lines of Victory, inoculated with 16 F_2 cultures of race 22 x race 24 of *M. Lini*, were divided into 4 groups, A, B, C and D, according to their reactions to infection. Genotypes concerned with rust resistance were postulated for each line, and evidence

for these was obtained from studies on segregation in offspring from crosses of the four Victory groups with a rust susceptible flax and varieties having genes in the *L*, *M* and *N* series (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1700). Resistance proved to be conditioned by M^7 in group A (M^7M^7nn); by *M*, identical with the gene determining resistance in Newland flax, in group C (*MMnn*); by MN^5 in group B (MMN^5N^5); and by M^7N^5 in group D ($M^7M^7N^5N^5$). The gene N^5 in B and D groups conditions resistance to all known races in North America, consequently the most promising B and D selections have been increased.

1286. Streets, R. B.
Wilt-resistant flax.
Progr. Agric. Ariz. **1951** : **3** : No. 3 : p. 8.

As a result of tests of 35 flax varieties and hybrids in Arizona, CI 1329, CI 1151, B–5128 and CI 1164 are recommended to replace Punjab in wilt infested soil until better varieties are available. Of the hybrids, 13 are to undergo further trial and 3 are to be increased. Selection for wilt resistance in DeAnza has resulted in greatly increased yield. Promising wilt resistant selections have been secured from Calar x CI 1040.

1287. *Hrennikova, G. A.
(The production of hemp seed for sowing as a fibre crop).
Selekcija i Semenovodstvo (Breeding and Seed Growing) **1951** : No. **4** : 67–70. [Russian].

The possibility of selecting and developing strains capable of producing seed as well as fibre in the northern Ukraine is discussed. Varieties grown in these areas of short photoperiods show greater morphological variability than when they are grown in southern districts.

1288. Illies, Z. M.
Untersuchungen über die Auslesemöglichkeit faserreicher Kreuzungsnachkommen auf mikroskopischem Wege bei züchterischen Arbeiten mit Bastfaserpflanzen (Am Beispiel der Faserneselzüchtung). [**Investigations on the possibilities of selecting hybrid progenies with high fibre content by microscopic methods in breeding work with bast fibre plants (based on examples from fibre nettle breeding)**].
Bot. Oeconom., Hamburg **1948** : **1** : 86–116.

The results are reported of a detailed anatomical study of 88 plants of selected lines of nettle (*Urtica dioica*) differing in fibre content. A cross section through the middle internode of mature plants showed clear differences between lines of high and low fibre content in respect of the thickness of the fibre layer in proportion to the total diameter of the stem; this value showed a negative correlation with percentage of xylem in the stem and a significant positive correlation (quoted as r = 1·2 [*sic*] ± 0·037) with total fibre content and can therefore be used in breeding work for making preliminary selections of segregates with high fibre content. An advantage of the method was that it proved more accurate in distinguishing plants with high fibre content than those with low. The actual values varied according to growth conditions but the relative order of the lines remained the same.

1289. Sato, O.
(The origin and phylogeny of the caryotypes of the Agavaceae).
Idengaku Zasshi / Jap. J. Genet. **1947** : **22** : p. 28; also Bot. Mag. Tokyo **1947** : **60** : 31–36. [Japanese].

Five phylogenetic caryotypic series are recognized within the Agavaceae, some having their origin in the Liliaceae and passing into the Palmae. The series are: (1), a 60-chromosome lineage represented by *Eucomis*, *Hosta* and *Agave*; (2) a 36-chromosome series, *Ophiopogon*, *Nolina* and *Trithrinax*; a 32-chromosome series, *Dianella*, *Phormium* and *Cocos*; a 36–38-chromosome series, *Dracaena*, *Phoenix*, *Livistona* and *Oreocloxa*; and the *Doryanthes* type ($2n = 48$).

SUGAR PLANTS

1290. Stevenson, G. C.
Report on a visit to St. Lucia and Grenada, July, 1951.
Bull. BWI Cent. Sug. Cane Breed. Sta. **1951** : No. 36 : Pp. 8.

The performance of Barbados sugar cane varieties in St. Lucia and Grenada is discussed. B 37172 and B 4362 are recommended for the main plantings in St. Lucia; B 37161 should also be retained, particularly for late reaping, until suitable varieties with higher juice quality are available. In Grenada, B 41227, B 4098 and B 4362 are supplanting the standard B 37161.

* An extended summary of this paper is on file at the Bureau.

1291. **Proceedings of the Seventh Congress of the International Society of Sugar Cane Technologists, Brisbane, 25th August-15th September, 1950** (1951) : Pp. 795.

Papers presented at the conference included the following:—

Brandes, E. W. Changes in seasonal growth gradients in geographically displaced sugar cane. (*pp. 1–32*).

Average monthly growth increments of numerous clones of *Saccharum spontaneum, S. Barberi, S. sinense, S. edule, S. officinarum, S. officinarum* x *S. spontaneum* and *Erianthus* are greater at latitudes corresponding to the geographic centres of origin than in other latitudes, but many clones show adaptability to the stimulating effects of increased day length at higher latitudes. The wide range of tolerance and plasticity observed indicates that the clones have not yet been subjected to intensive natural selection in their areas of natural distribution.
It is noted that a consideration of other factors besides growth would probably reveal more specific adaptation to particular environments.

Lee [Li], S. and Lin, K. S. Studies of the photoperiodic effect on sugar cane. (*pp. 33–43*).

The effects of varying photoperiodic treatments on the diameter and rate of elongation of internodes are compared in POJ 3016, which is a short day cane, and a long day variety of *S. spontaneum* indigenous to Taiwan. Although indigenous forms of *S. spontaneum* have always flowered too early in Taiwan for hybridization with noble canes, experimental results show that exposure to day lengths of 9 and 15 hrs. effectively delays flowering and permits crossing with commercial varieties.

Brett, P. G. C. Flowering and pollen fertility in relation to sugar-cane breeding in Natal. (*pp. 43–55*).

A technique evolved for increasing pollen fertility by subjecting canes to warm conditions (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2011) is described, with reference to subsequent extension of cane breeding, using varieties formerly considered male sterile.

King, N. J. Varietal deterioration in Queensland. (*pp. 56–62*).

Factors which may have contributed to the deterioration of many varieties of sugar cane grown in Queensland are discussed (cf. *Plant Breeding Abstracts*, Vol. XXI, Absts 1217 and 1218).

Gard, K. R. Twenty-five years of sugar-cane breeding at Macknade, Queensland. (*pp. 62–73*).

Improved techniques for pollinating and selecting breeding material are contrasted with former methods. Many of the best varieties developed at Macknade are derived from Korpi, Badila, Oramboo and Q 813; more recent work indicates that hybridization incorporating F_2 hybrids from crosses between commercial varieties and *S. spontaneum* increases the earliness and vigour of new seedlings.

Stevenson, G. C. New horizons in sugar-cane breeding. (*pp. 73–82*).

Cytogenetical research under way at the British West Indies Sugar Cane Breeding Station, Barbados, includes the analysis of breeding material and production of inbreds for future synthesis of hybrids of known constitution.

Thuljaram Rao, J. Xeromorphic adaptations in sugar cane for resistance to drought. (*pp. 82–89*).

Anatomical investigations of varieties grown at Coimbatore have revealed that varieties of *S. spontaneum* possess structural adaptations conferring drought resistance, whereas canes of *S. officinarum* lack similar modifications and are susceptible to drought. These structural criteria of the reaction to water shortage will be used for selecting suitable parents and evaluating their offspring.

Buzacott, J. H. Recent trends in the production of cane seedlings in Queensland by the Bureau of Sugar Experiment Stations. (*pp. 90–97*).

Recent progress in interspecific and intervarietal hybridization is summarized and indications are given of future objectives (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1206).

Abbott, E. V. and Summers, E. M. An appraisal of some sugar-cane parent varieties and their progenies with particular reference to disease resistance. (*pp. 97–109*).

Data are presented concerning the origin and characteristics of some of the best progenies developed by the US Department of Agriculture. Superior parents include Co. 281, which has transmitted earliness, red rot resistance and other commercially desirable qualities, and CP 1165, possessing mosaic resistance.

Abbott, E. V. and Summers, E. M. Disease testing and initial selection procedure in sugar-cane seedling progenies at the U.S. Sugar Plant Field Station, Houma, Louisiana. (*pp. 109–16*).

Methods of conducting trials for selection of disease resistant seedlings are outlined.

Arceneaux, G., Coleman, R. E. and Hebert, L. P. Evidence of inheritance of resistance to freeze injury in sugar-cane seedlings produced at Canal Point, Florida. (*pp. 116–27*).

Wide variation among progeny groups in respect of degree of injury caused by low temperatures suggests that inheritance of resistance is controlled by multiple factors. Linkage was observed between high sucrose content and resistance to low temperatures, but a negative correlation was observed between the latter and extractable juice content.

de Sornay, A. The selection of sugar-cane seedlings from first-ratoon populations. (*pp. 128–34*).

Results of trials in Mauritius indicate that selections made from first ratoon populations with desirable characteristics show less variability than those from seedling canes.

Mathes, R., Hayslip, N. C., Bynum, E. K., Grassl, C. O. and Bregger, T. The use of resistant varieties of sugar cane in the control of the sugar-cane borer. (*pp. 168–77*).

Tabulated data are given on the relative borer resistance of progenies of numerous crosses made by the US Department of Agriculture. Of the commercial varieties tested, CP 34–79 is highly resistant; it has been used with CP 34–120, CP 33–372 and CP 43–49 in many crosses.

Nolla, J. A. B. Injury to sugar cane from 2,4–D. (*pp. 178–90*).

Differential responses to injurious effects of 2,4–D have been found in varieties grown in Puerto Rico. Although most varieties under 8 weeks old are temporarily protected by leaf sheaths, marked tolerance at later stages was shown only by M 272, POJ 2940, Co. 421, BH 10–12, SC 12–4 and Kavangire.

Sun, V. G. and Liu [Lu], P. D. The effect of lime-water treatment on seed cane using different sources of seed material. (*pp. 202–09*).

Results of pregermination lime water treatment of sugar cane seed pieces in Taiwan show that the varieties F 134, Co. 290 and POJ 2883 responded more favourably than F 1108.

Loh [Lo], C. S. and Hu, T. H. The generic cross of Saccharum-Miscanthus. (*pp. 243–54*).

At the Pingtung Station, Taiwan, many recently developed hybrids of *Saccharum* x *Miscanthus* have shown greater ratooning capacity, sucrose content and adaptability to subtropical conditions than locally grown commercial sugar cane varieties. The early maturing hybrid PT 33–84 ($2n = 72$), from the cross POJ 2725 x *M. japonicus*, possesses outstanding characteristics. Although successful crosses have only been induced comparatively recently it is assumed that natural hybridization between *Saccharum* and *Miscanthus* has not been uncommon; three naturally occurring intergeneric hybrids have been found in southern Taiwan.

Further reference is made to the resemblance between trihybrids of (*S. officinarum* x *S. robustum*) x *M. japonicus* and *Erianthus* (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 467).

Loh [Lo], C. S. and Tseng, P. M. Notes on sugar cane nobilization methods. (*pp. 254–65*).

From analyses of the proportion of noble canes in the progenies of numerous crosses effected at the Pingtung Station, Taiwan, in 1948, the relative desirability of parent varieties, with respect to transmission of vigour or sucrose content, has been assessed. The progenies of *S. officinarum* x *Miscanthus* and *S. officinarum* x *S. spontaneum* are more promising than those derived from *S. officinarum* crossed with either *S. Narenga* or *Erianthus*. Male sterility in the progenies from intergeneric crosses, however, prevents further nobilization.

Li, H. W., Cheng, C. F. and Leung [Liang], T. C. Genetical analysis of the hybrids obtained in crossing P.O.J. 2725 and Miscanthus japonicus. (*pp. 266–76*).

Four hybrid lines from crosses between POJ 2725 ($2n = 107$) and *M. japonicus* ($2n = 38$) have been analysed with respect to their degree of nobilization as OOM or OM types, OO and MM representing the respective genetical constitutions of the parents. Hybrids of the OOM type possess the complete POJ 2725 gene complex and consequently have a high sugar content; when back-crossed to ♀ noble canes, their progeny are mostly of the $OO\frac{M}{2}$ type, thus incorporating both high sugar content and

desirable *Miscanthus* characters in a single back cross. On the other hand, OM hybrids must be back-crossed to noble canes many times before a high sugar content is achieved; meanwhile, desirable qualities of the ♂ parent (*M. japonicus*) are gradually lost.

Li, H. W. and Ma, T. H. Cytological studies of sugar cane and its relatives. VIII. Accessory chromosomes of Miscanthus japonicus, *Anders.* (*pp. 277–85*).

A specimen of *M. japonicus* with 3 accessory chromosomes, each less than one quarter the size of the 19 usual pairs, was found near Taipei, Taiwan; it is morphologically indistinguishable from normal plants ($2n = 38$). During diakinesis the three accessories, which are apparently identical in size, associated as trivalents either in a chain or a cluster; occasionally a bivalent and a univalent were observed, but only rarely were three univalents found. In 50% of the cells, the accessories were associated with two normal bivalents of unequal size by means of tenuous chromatic threads. It is assumed that the three accessories are multiples of an original fragment. Homology between the accessories and parts of the two chromosomes of unequal size indicates that the original accessory was derived from these chromosomes. It is suggested that in an abnormal division the bivalents failed to pair and a plant with one extra chromosome was thus obtained; in a subsequent telophase the lagging accessory became transversely bisected, the short arm containing an almost terminal centromere, while the long arm without a centromere was lost; the short fragment was incorporated into one of the gametes.
Precocious division of the small accessories was observed at metaphase in many cells, and at anaphase the cluster of accessories was irregularly divided between the poles. Possible limitations on the number of accessories are discussed; it is assumed that higher numbers will occur in successive progenies.

Dutt, N. L. and Thuljaram Rao, J. The present taxonomic position of Saccharum *and its congeners.* (*pp. 286–94*).

Results are given of detailed morphological, anatomical and cytological analyses of the collection of *Saccharum, Erianthus, Sclerostachya* and *Narenga* specimens at Coimbatore. Necessary taxonomic deviations from Hooker's conception of the genus *Saccharum* in the *Flora of British India* are outlined.

Dutt, N. L. The present cane varietal position in India. (*pp. 294–303*).

Changes in the popularity and regional distribution of sugar cane varieties since the last census in 1943 are summarized.

Tucker, R. W. E. A twenty-year record of the biological control of one sugar-cane pest. (*pp. 343–54*).

Mention is made of differences in varietal susceptibility to *Diatraea saccharalis* in Barbados.

Dick, J. Sugar-cane entomology in Natal, South Africa. (*pp. 377–94*).

An account of insect pests of sugar cane stresses that promising new varieties should be thoroughly tested for insect resistance in order to maintain the relative insignificance of insect damage in Natal (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2882).

Lo, T. T. A report on sugar-cane diseases in Taiwan. (*pp. 452–56*).

The relative susceptibility of different varieties to prevalent leaf and stalk diseases is reviewed.

Steindl, D. R. L. Ratoon stunting disease. (*pp. 457–65*).

An account is given of the deterioration of Q 28 in Queensland; the possibility that other varieties are also susceptible is discussed.

1292. Fors, A. L.
Experiencias con las variedades "Cuba". (**Observations on the Cuba varieties**). Bol. Ofic. Asoc. Téc. Azucar., Cuba 1951: **10** : 143–49.

Information is presented on the morphology, diagnostic characters, quality of the juice, adaptability to soil conditions, and resistance to diseases of the Cuban varieties: C 4772 (CPH 115 x ?), a rapidly growing cane but liable to lodge; C 10049, a variety that germinates freely and grows well but with juice of poor quality; C 15792 (POJ 2725 x Co. 281), a cane with slow initial growth but the highest quality juice of any Cuban variety; C 15794 (POJ 2725 x Co. 281), a variety resembling C 15792, but growing more quickly at first and with a lower sugar output; and C 15855 (POJ 2725 x Co. 281), a variety with fairly good adaptability to unfavourable conditions.

1293. Fors, A. L.
Estudios con nuevas cañas "Coimbatore". (**Studies with new Coimbatore canes**). Bol. Ofic. Asoc. Téc. Azucar., Cuba 1951 : **10** : 251–59.

A brief historical account is given of the work of interspecific crossing in sugar cane that has given rise to the Coimbatore canes; some of

them, such as Co. 213 and Co. 281, are still the only canes that can be grown successfully in certain unfavourable areas in Cuba. Descriptions are given of Co. 301, 331, 419 and 421. The last two are considered too low in sugar production, but the first two are possible substitutes for Co. 213 and 281 respectively.

1294. RAGHAVAN, T. S.
The sugarcanes of India. Some cytogenetic considerations.
J. Hered. 1951 : **42** : 199–206.

Cytogenetical investigations carried out at Coimbatore to determine the interrelationship between species of *Saccharum* and allied genera are reviewed; particular reference is made to a survey of the capacity to form both diploid and haploid gametes.

1295. PARTHASARATHY, N.
Chromosome elimination in *Saccharum*.
Nature, Lond. 1951 : **168** : 383–84.

The selfed progeny of Co. 421 ($2n = 118$) and the progenies of wide crosses involving Co. 421 included canes of parthenogenetic origin, with $2n = 86$. Cytological data suggest that such canes arise by the elimination of 16 bivalents as the result of the formation of two spindles in the egg mother cells, and by the occurrence of endomitosis in cells with $n = 43$. The smaller group of chromosomes is eliminated. The significance of this phenomenon in the evolution of the genus *Saccharum* is discussed.

1296. BUZACOTT, J. H. and HUGHES, C. G.
The 1951 cane collecting expedition to New Guinea.
Cane Gr. Quart. Bull. 1951 : **15** : 35–72.

Details of 162 specimens of wild and locally cultivated *Saccharum* and 3 varieties of a *Miscanthus* species collected in New Guinea for future breeding purposes are listed (cf. Abst. 568).

1297. KNOWLES, W. H. C. and CAMERON, C.
Field experiments with sugar cane, XIX.
Sug. Bull. Dep. Agric., Brit. Guiana 1951 : No. 19 : 1–36.

Varietal trials with selections from Barbados are reported. B 41227 has proved outstanding in respect of cane yield and juice quality; it has been added to the list of recommended varieties.

1298. ARRUDA, S. C. and TOFFANO, W. B.
O carvão da cana no estado de São Paulo. (**Cane smut in the state of São Paulo**).
O Biológico, São Paulo 1951 : **17** : 155–65.

Notes are included on sugar cane varieties resistant to *Ustilago scitaminea* in São Paulo (Brazil).

1299. CHONA, B. L.
Studies on the diseases of sugarcane in India. III. Sources and modes of red rot infection.
Indian J. Agric. Sci. 1950 : **20** : Pt. III : 363–85.

Considerable varietal differences in resistance to infection with red rot (*Colletotrichum falcatum*) were observed.

1300. VASUDEVA, R. S. and CHONA, B. L.
Fighting red rot epidemic.
Indian Fmg 1951 : **1** : No. 6 : 23–26.

Trials of sugar cane varieties for red rot resistance have been carried out at the Indian Agricultural Research Institute, New Delhi, during the past 14 years. Commercial canes, parent varieties and *Saccharum* species have been tested. Resistant or moderately resistant commercial canes are listed. Breeding for red rot resistance has been initiated.

1301. VERMA, S. C. and MATHUR, P. S.
The epidermal characters of sugarcane leaf in relation to insect pests.
Indian J. Agric. Sci. 1950 : **20** : Pt. III : 387–89.

Varieties possessing higher numbers of teeth on the lower surface of the midribs were found to be less susceptible to attack by top borer (*Scirpophaga nivella*) than those with lower numbers.

1302. McM., A.
Experiment Station Notes. Result of field trials : plant food investigations.
S. Afr. Sug. J. 1951 : **35** : 541–45.

The results of a series of South African trials comparing 14 N : Co. sugar canes with Co. 301 and Co. 464 show that N : Co. 339 has consistently outyielded other varieties since 1945.

1303. **Seventeenth Annual Report of the British West Indies Central Sugar Cane Breeding Station, Barbados, for the year ending September 30th, 1950** : Pp. 48.

Tabulated data are given on large numbers of crosses, seedling selections and trials undertaken at the Central Sugar Cane Breeding Station, Barbados, and the performance of selected varieties in Antigua, Barbados, British Guiana, Jamaica, St. Kitts and Trinidad. Two high yielding third year seedlings, B 46397 and B 46223, are morphologically indistinguishable from B 41211 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2864); cytological investigations are

in progress to determine whether all three varieties are in fact the same. B 45151 and B 45152 also gave high yields of cane; they are both derived from B 39254 x B 34104, and incorporate certain characteristics from *S. Barberi*, *S. spontaneum*, *S. officinarum* and *S. sinense*. In first ratoon trials B 41211 proved outstanding with respect to cane yield; B 41227 produced juice of slightly lower quality than that of the standard B 37161.

1304. **New sugar sorghum.**
Aust. Sug. J. 1951 : **43** : p. 380.

Sart, a new late maturing sweet sorghum, has been released by the US Department of Agriculture in cooperation with the Mississippi Experiment Station; it originates from African seed introduced in 1945. Sart has tall stout stems with high sugar content and produces large yields of good quality syrup.

1305. Heinisch, O.
Beitrag zur Kenntnis der Blüh- und Befruchtungsverhältnisse bei *Beta vulgaris* L. (**Contribution towards the knowledge of the flowering and fertilization relationships in *B. vulgaris* L.**).
Z. Pflanzenz. 1951 : **30** : 405–13.

A detailed description is given of the normal flowers in *B. vulgaris* and of a number of anomalies observed by the author. An examination of the seedlings of a plot of the variety Veni, Vidi, Vici, surrounded by varieties with coloured hypocotyl, showed the degree of cross pollination to be 40%. Other similar, but slightly less reliable, experiments gave figures of over 25% and 40% respectively.

1306. Tiščenko, A. V.
(**The effect of size and number of seed germs in sugar beet upon quality of the seed**).
Agrobiologija (Agrobiology) 1951 : No. 2: 114–17. [Russian].

Varieties bred for single germ seed at the Jaltuškovskiĭ Breeding Centre in the Ukraine are mentioned. Some individuals of these varieties have produced seed with several germs, which proved superior biologically to large single germ seed.

1307. **New GW 304 variety.**
Through the Leaves, Colorado 1951 : **39** : No. 5 : 39–40.

The recently released sugar beet, GW 304, developed at Fort Morgan, Colo., gives high yields of roots with satisfactory sugar content; it is winter hardy and shows resistance to leaf spot. Improved leaf spot resistance is shown by a recent selection from GW 304; complete immunity is characteristic of three wild relatives but their hybrids with commercially desirable varieties are sterile. Although GW 304 shows little tendency to bolt, two recent selections made from GW 304 possess even greater resistance to bolting.

1308. von Archimowitsch, A.
El cultivo de remolacha azucarera para la obtención de semillas. (**The cultivation of sugar beet for seed production**).
Bol. Inst. Nac. Invest. Agron., Madr. 1951 : **11** : No. 24 : 79–82.

The various factors which affect flowering in beet, such as temperature, light, humidity and genetic constitution, are discussed and the conditions most suitable for selecting non-bolting strains are indicated. In general, long days after a period of low temperature favour flowering; drought depresses it, even in the second year.
After descriptions of the morphology of the inflorescence, flower and seed, of the process of pollination, and of the most common pollinating insects, indications are given of the distances necessary for isolation (5–6 km.) and the methods of cultivating sugar beet for seed, in general and under Spanish conditions in particular.

1309. Lackey, C. F.
Histological studies of injury produced by four strains of curly-top virus on susceptible and resistant sugar beets.
Phytopathology 1951 : **41** : 940–41. (Abst.).

In order of decreasing virulence, strains 22, 1, 2 and 6 cause symptoms ranging from extensive vascular hypertrophy to inconspicuous necrotic areas in the susceptible beet, SL 842. Injury is similar but comparatively slight in SL 86.

STIMULANTS

1310. Wöber, O.
Wege und Ziele der Tabakforschung. (**Ways and objectives in tobacco investigation**).
Fachl. Mitt. Öst. Tabakregie 1951 : No. 1 : 5–10.

In a review of the results of scientific research applied to the tobacco plant, after an account of the history of tobacco cultivation from pre-Columbian times, some special problems of breeding are considered. The extreme difficulty

of obtaining genetic purity, even in populations which are morphologically uniform, is emphasized. This accounts for disappointments that have been experienced with many new varieties produced by breeders, especially if they are released before sufficiently extensive testing has been carried out.

1311. Bolsunov, I.
Die Ergebnisse und Aussichten der Tabakzüchtung in Österreich. (**The results and prospects of tobacco breeding in Austria**).
Fachl. Mitt. Öst. Tabakregie 1951 : No. 1 : 11–17.

A large type collection has been built up to serve as a basis for breeding, and the most promising types in the collection are tested on a field scale to determine their suitability for cultivation in Austria. Selection is being practised on the varieties already in cultivation, such as Debreczener and Ungarischer Riese [Hungarian Giant]. In this way it has been possible to select forms of Debreczener less susceptible to wildfire (*Bacterium tabacum*).
Intervarietal crosses are being carried out in the hope of attaining a number of desired combinations of characters, which are enumerated. By selection of transgressive hybrids it has been possible to produce cigar tobaccos with 25–40 usable leaves; plants having internodes 2–3 times shorter than the average; and giant forms of cigar, Virginia and Burley tobaccos reaching a height of 3·5 m. and more, with yields of 200–250 grm. of dried leaves per plant. Hybrid seed of Havanna IIc (Forchheim) x Debreczener has given plants distinguished by heterosis and an extremely healthy condition and is being tried on a field scale.
A certain amount of study is being devoted to the use of American interspecific hybrids resistant to mosaic and *Thielavia* and to the production of artificial tetraploids in *Nicotiana rustica*.

1312. Bolsunov, I.
Über die Zweckmässigkeit und Möglichkeit der Schaffung eines internationalen Schutzes der Arbeit (der Resultate) der Tabakzüchter. [**The desirability and possibility of creating an international protection of the work (results) of tobacco breeders**].
Fachl. Mitt. Öst. Tabakregie 1951 : No. 2 : 26–27.

In this contribution to the June 1950 meeting of ASSINSEL (Association Internationale des Sélectionneurs professionnels pour la Protection des Obtentions végétales) it is pointed out that special factors associated with *Nicotiana Tabacum* and *N. rustica* make the institution of patents for newly bred varieties more difficult in some respects and more feasible in others. Concrete proposals are presented for a system of international protection.

1313. Aniţia, N. and Ioan, E.
Reinoirea seminței de tutun prin hibridări in interiorul soiului. (**Renewal of tobacco seed by means of intravarietal hybridization**).
Bul. Cultiv. Ferment. Tutun. 1950 (1951) : **39** : 99–115.

Yield increases up to 20% are reported after applying intravarietal hybridization to Rumanian tobacco varieties.

1314. Gisquet, P., Hitier, H., Izard, C. and Mounat, A.
Mutations naturelles observées chez *N. Tabacum* L. et mutations expérimentales provoquées par l'extrait à froid de graines vieillies prématurément. (**Natural mutations observed in *N. Tabacum* L. and mutations experimentally induced by cold extract of prematurely aged seeds**).
Ann. Inst. Exp. Tabac Bergerac 1951 : **1** : No. 2 : 5–35.

Mutations in plants raised from *Nicotiana Tabacum* seed that had almost reached the limit when germination capacity becomes exhausted are listed with illustrations and descriptive notes on their botanical characteristics and cytological behaviour in meiosis.
The importance is pointed out of using properly stored seed of normal germination capacity in maintaining pure lines. Mention is made of P. Gisquet's earlier observations on the occurrence in variety Nijkerk of *N. Tabacum* of generalized mutations appearing in the majority of the members of a population. The anomalies displayed resembled those often occurring in the F_2 of *N. Tabacum* x *N. sylvestris* and sometimes too in unstable intervarietal hybrids. By selection among the mutant progeny useful new and stable types were obtained.
Experiments also showed that extracts from seeds that had almost reached the end of the period during which germination was possible could induce in normal plants mutations similar to those obtained from aged seed. As a

possible explanation of these phenomena, some chemical reaction in the seed might be supposed to lead to the formation of a mutagenic agent of unknown nature.

1315. İPEKOĞLU, F.
Tütün ziraat ve islah kısmı. (**Tobacco breeding and cultivation**).
Tekel Enst. Raporları 1949 : **5** : 169–73.

The routine work of the various tobacco centres and breeding stations for 1947–8 is described, viz. selection of élite and local varieties, planting in observation plots, and, in some cases, testing the cured tobacco. A table is given of the pure lines developed in various tobacco sowing regions, in connexion with the standardization programme. Viability of seeds produced by cuttings kept in water culture was tested; those from cuttings of İzmir tobacco had a viability of 97·6%.
The percentage for the second best variety, Bursa, was 87·4%.
The variety Trabzon, noted for its high nicotine content, was found to be falling off in this respect, owing to neglect of seed selection. In 1947, some 10,000 élite plants were analysed. Individuals were found with a nicotine content of 5·8%. The search for Trabzon tobacco with a high nicotine content was continued in 1948.
Experiments were also carried out on resistance to disease and incidence of cross fertilization.

1316. DUSSEAU, A., FARDY, A. and HITIER, H.
Nicotiana polyploïdes : espèces tétraploïdes et hybrides interspécifiques amphidiploïdes obtenus par l'action de la colchicine. (***Nicotiana* polyploids : tetraploid species and interspecific amphidiploids obtained by colchicine treatment**).
C.R. Acad. Sci. Paris 1944 : **218** : 124–26.

Brief notes are presented on the characteristics of colchicine-induced tetraploids of *N. Tabacum, N. rustica, N. acuminata, N. Bigelovii, N. glauca, N. glutinosa, M. longiflora, N. plumbaginifolia, N. paniculata, N. nudicaulis, N. quadrivalvis, N. repanda, N. sylvestris, N. trigonophylla, N. suaveolens* and *N. Sanderae*, and of colchicine-induced amphidiploids of *N. rustica* x *N. paniculata, N. Tabacum* x *N. sylvestris, N. suaveolens* x *N. glutinosa, N. glutinosa* x *N. sylvestris, N. Tabacum* x *N. glutinosa, N. suaveolens* x *N. quadrivalvis*, and *N. quadrivalvis* x *N. Tabacum*.

1317. OTAR, Ş. and TAN, A.
Yerli tütün çeşidlerimizde değişik ökoloji şartları altında ve en yakın mesafede vukua gelen yabancı döllenme nisbeti. (**The incidence of cross fertilization in native tobacco varieties under varying ecological conditions and the closest distance at which it takes place**).
Tekel Enst. Raporları 1949 : **5** : 227–29.

In 1948 experiments were carried out at Samsun, Maltepe, İzmir, and Malatya, with pure lines of local varieties of *Nicotiana Tabacum*, which were planted in a plot 10 metres square. At flowering time 20 plants were picked out of each variety, each 20 being divided into two groups, A and B, of 10 each. It was contrived that group A should only be cross-fertilized, while group B was left to be either self or cross-fertilized.
Cross fertilization, which took place in all varieties, was 40–90% at Maltepe, 20–90% at Samsun and 50% at Malatya. The incidence of cross fertilization in the same variety was shown to vary under different ecological conditions.

1318. ŽUKOV, N. I.
(**Some problems of the biology of fertilization in tobacco**).
Agrobiologija (Agrobiology) 1951 : No. 3 : 140–43. [Russian].

The selective capacity of several varieties of tobacco was investigated in multiparental crosses at the Suhumi and Frunze Tobacco Research Stations of the USSR Scientific Research Institute of Tobacco.
At Suhumi, the local standard Samsun 27 was pollinated with mixtures of self pollen and pollen of one other variety. Altogether eight varieties were tested, the amounts of pollen of Samsun 27 and that of other varieties being in each case in the ratios 2 : 1, 1 : 1, 1 : 2 and 1 : 4. The experiments showed that Samsun 27 usually preferred the pollen of other varieties to self pollen. The only two crosses which gave more selfed than hybrid plants were Samsun 27 x (Samsun 27 + Trebizond 1867) and Samsun 27 x (Samsun 27 + Tyk-Kulak 235). In both cases the ratio of self pollen to foreign pollen was 2 : 1.
In the experiments at the Frunze Tobacco Research Station, Trebizond 1272 and Ostrokonec 1906 preferred foreign pollen to self pollen when pollinated with a pollen mixture. In other crosses, self pollen was preferred to foreign pollen.

The progenies of Dubec 44 x (Dubec 44 + Maryland 2165) and of Dubec 44 x (Dubec 44 + Ambalema) gave higher percentages of hybrids than selfed plants except when the amounts of self pollen were at least twice as large as those of foreign pollen.

1319. Poljakov, I. M. and Mihaĭlova, P. V. **(The growth of pollen tubes in the different sections of the pistil and selective fertilization).**
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 1 : 31–55. [Russian].

Mičurinite investigations of fertilization processes in *Nicotiana Tabacum* and *N. rustica* are reported. The material comprised *N. Tabacum* varieties Hodosevič, Ostrokonec 1906 [Pointed End 1906], Trebizond 1272, Dubec 44 originating from Frunze, Dubec 44 originating from Yalta, American 572 and the multiple hybrids Gibrid Tomskiĭ [Tomsk Hybrid] and Sigarnyĭ Tomskiĭ [Tomsk Cigar], and the following *N. rustica* varieties: Želtaja 109 [Yellow 109] originating from Tomsk, Kireevskaja [Kireev], Pehlec, AS 18/7 and Vysokoroslaja Zelenaja [Tall Green]. In both instances the first named variety was used as female parent and was pollinated with pollen mixtures. These consisted of self pollen and pollen of one of the other varieties listed within each group. At definite intervals portions of the style were excised and analysed.

The evidence suggests that the fertilization processes are selective not only during their final phase, but also during earlier stages beginning with the growth of the pollen grains on the stigmas and until the pollen tubes reach the embryo sacs. Sometimes, the female and male variety showed the same degree of compatibility before the release of the gametes as after, but in other instances they were either more or less compatible during the later stage of fertilization. Compatibility after the release of the gametes is regarded as more important than compatibility in the earlier stages.

It was concluded that the mechanism of the processes of selective fertilization between compatible components in an intraspecific cross is basically the same as that between components showing varied degrees of incompatibility, such as occur in some intraspecific and most interspecific crosses.

The Mendelian concept of selective fertilization, founded on the idea of inequitable competition between the pollen tubes, is criticized from the Mičurinite viewpoint.

1320. Cuzin, J., Fardy, A. and Schwartz, D. Microchirurgie de la graine de tabac. Technique et premiers résultats. **(Microsurgery of the tobacco seed. Technique and initial results).**
Ann. Inst. Exp. Tabac Bergerac 1951 : **1** : No. 2 : 37–54.

An attempt was made to analyse the particular properties found in the so-called "special" lot of seed used by P. Gisquet *et al.* (cf. Abst. 1314) in their experiments, but the seed failed to germinate. In studying the cause of this loss of viability, it was found that seedlings from normal seeds from which the albumen had been partially removed exhibited anomalies similar to those found in the seedlings raised from the seed lot used by Gisquet and his collaborators. Surgical interference, e.g. amputation, and also grafts, both interspecific and intergeneric, were therefore tried to see whether the phenomena noted in the special lot of seed could be experimentally induced.

In discussing the results so far obtained the authors suggest that some of the secondary effects of surgical interference with the embryo may be precursors of fundamental changes of the hereditary potentialities, i.e. mutations. How the similarity of the effects after surgical treatment and after chemical treatment should be interpreted is also considered.

1321. Ollero Gómez, A. and Cota Galán, R. Estudios sobre selección de plantas de tabaco por su contenido en nicotina. I. Método químico para determinar el alcaloide. **(Studies on selecting tobacco plants for nicotine content. I. A chemical method of determining the alkaloid).**
Bol. Inst. Nac. Invest. Agron., Madr. 1951 : **11** : No. 24 : 1-27.

Studies were made of the effect on the colorimetric determination of nicotine content in aqueous extracts of tobacco leaves of such factors as pH, concentration of nicotine, other compounds and temperature. A reliable method was found to be extraction with small pieces of glass, saturating the solution with MgO to bring it to a standard pH, and adding 5 cc. of a 0·2% solution of α-naphthylamine and 1 cc. of a solution of NaCN in bromine water. The results obtained agreed satisfactorily with those from analysis after extraction with steam.

1322. Bolsunov, I.
Zur Prüfung neuer interessanter Tabaksorten aus dem Weltsortiment in der Tabakzüchtungsstation in Fürstenfeld. **(Testing new interesting tobacco varieties from the world collection at the Fürstenfeld Tobacco Breeding Station).**
Fachl. Mitt. Öst. Tabakregie 1951 : No. 2 : 6–11.

The collection of tobacco varieties at this Austrian station contains, in addition to a wide range of varieties of all types, a special collection containing practically all the varieties of cigar tobacco grown anywhere in the world. Those of the most interest for breeding purposes are described, and include varieties and hybrids from Spain, Italy, Holland, Belgium and France. The most interesting of the cigarette tobacco types in the collection are also described.
Particular interest for breeding purposes attaches to some of the South American tobaccos, including the mosaic-resistant Ambalema, and to some of the author's own selections, such as a Siberian local tobacco which is the earliest *Nicotiana Tabacum* form in the collection, and flowers 30–38 days after planting. Special collections of *gigas* forms and of wild *Nicotiana* species are also maintained.

1323. Astorga B., E., Quintana F., R. and Koch W., E.
Tobacco Grading Plant and Experimental Station, Chagres, Province of Aconcagua, Chile.
Report on Year's Work, Seasons 1948/49–1949/50 : Pp. 18.

Part III presents detailed results of varietal trials with air-cured and cigar tobaccos. For five years 33 Little Orinoco, an introduced air-cured variety giving yields similar to the standard 36 Paraguay Corriente, has proved superior in respect of growth habit, early maturity, leaf quality and resistance to mosaic virus. Although no imported cigar types have yet outyielded the standard 35 Habano Chagres (cf. *Plant Breeding Abstracts*, Vol. II, Abst. 1074), the early maturity of 18 Wisconsin Seedleaf enables harvesting at the maximum degree of ripeness and thus ensures a superior quality. Both 18 Wisconsin Seedleaf and 33 Little Orinoco are recommended to local growers.
Breeding work for mosaic resistance, early maturity and suitable distance between nodes has continued (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1074).

1324. Riley, E. A.
Pathological and physiological studies on the brown spot disease of tobacco caused by *Alternaria longipes* (Ell. and Ev.) Mason.
Mem. Dep. Agric. S. Rhod. 1949 : No. 3 : Pp. 34.

While undergoing pathogenicity tests under greenhouse conditions, White Stem Orinoco proved less susceptible to *Alternaria* than three other tobacco varieties commonly grown in Southern Rhodesia; relative field resistance has not yet been determined.

1325. Stover, R. H.
A strain of tobacco mosaic virus causing vascular necrosis and wilt of tobacco in Ontario.
Sci. Agric. 1951 : **31** : 424–28.

Greenhouse and field inoculations on numerous tobacco varieties and intervarietal hybrids have shown that a sparsely distributed Canadian strain of tobacco mosaic virus induces severe necrosis in plants carrying the genes $N'N'$ (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 1187), and chlorotic mosaic mottle, stunting and distortion in $n'n'$ varieties. The response of heterozygous $N'n'$ tobaccos suggests that N' is incompletely dominant.
During inoculation experiments on tomato, the original isolate gave rise to a mutant inducing distinctive mottling responses on both tomato and $n'n'$ tobaccos, but still capable of causing severe necrosis on $N'N'$ forms of tobacco.

1326. Schwartz, D. and Cuzin, J.
Faible susceptibilité d'une variété de *Nicotiana tabacum* vis-à-vis de la mosaïque du tabac. **(Weak susceptibility of a variety of *N. tabacum* to tobacco mosaic).**
Ann. Inst. Exp. Tabac Bergerac 1951 : **1** : No. 2 : 167–78.

When the two varieties, P.19 and Java Isère x Cabot, were compared under identical conditions of cultivation, the hybrid proved almost 10 times less susceptible than the control P.19, which had a considerably shorter incubation time. Like its parents the hybrid exhibited both the focal and the generalized reactions in response to inoculation.

1327. Bald, J. G. and Hammack, M.
Differentiation of some tobacco mosaic strains occurring naturally in tobacco.
Phytopathology 1951 : **41** : p. 935. (Abst.).

Mild and severe forms of tobacco mosaic virus with different electrophoretic mobilities have

been isolated from tobacco. Two strains with the same mobility, causing mottle and distortion respectively, produce yellow mutants which are translocated with difficulty within large tobacco plants; the mutants consequently fail to compete successfully against parent strains.

1328. Bennett, C. W.
Vein yellowing caused by a mutant of the curly-top virus.
Phytopathology 1951 : **41** : 935–36. (Abst.).

After apparently recovering from curly top infection a Turkish tobacco plant developed marked vein-yellowing due to another virus inseparable from that causing curly top. As the yellowing virus became established the concentration of curly top virus diminished. It is thought that the vein-yellowing virus originated from the latter by mutation.

1329. **Tea Research Institute of East Africa. Annual Report for the year 1950.**
1951 : Pp. 13.

The Tea Research Institute of East Africa, situated at Kericho, Kenya, was incorporated in May, 1951.
The preliminary stages of development during 1950 are described. Investigations are in progress to modify the general principles of propagation and selection, as defined by research institutes in India and Ceylon, according to local conditions. Data obtained from a plot of 6000 bushes cropped 20 times during the year are being analysed statistically; the results will provide a basis for designing future trials.

1330. Brilliant, V. A. and Begačeva-Muhina, V. A.
(The effect of shading upon growth and respiration and transpiration in the tea plant).
Bot. Ž. (Bot. J.), Moskva 1951 : **36** : 146–59. [Russian].

Differences in response to shading between *Thea sinensis* var. *sinensis*, *Th. sinensis* var. *japonica* and *Th. sinensis* x *Th. assamica* are described.

1331. **Annual Report of the Indian Tea Association.**
Tocklai Experimental Station 1950 : Pp. 39.

Correlation has been found between degree of leaf hairiness and quality. Selection for increased hairiness has resulted in improvements in leaf quality, but the latter are interrelated with climatic conditions.
Selection for seed size has produced a marked effect on leaf quality; plants grown from very small or very large seed are of inferior quality. A positive correlation exists between seed size and plant size.

1332. Kursanov, A. L.
(The tanning substances of the tea leaf in connexion with the problem of improvement of the quality of tea).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 2 : 44–52. [Russian].

Biochemical analyses showed that the tea varieties Gruzinskiĭ 1 and 2 [Georgian 1 and 2], which were bred by Mičurinite methods in 1948, contained more tanning substances than the local Georgian races of the Japanese and Chinese botanical varieties of tea. The quality of the tanning substances of the former varieties was also better.

1333. Bokučava, M. A.
(The Soviet conference on the problem of extending the cultivation of tea to new districts).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 4 : 139–41. [Russian].

The problems discussed at a conference held in Moscow in February 1951 included breeding tea for hardiness and breeding new varieties adapted to cultivation in Georgia, Azerbaĭdžan, the Krasnodar territory and the Transcarpathian region.

1334. Thomas, K. M.
Eleventh Quarterly Report of the Research Department of the Indian Coffee Board—July to September 1951.
Indian Coffee 1951 : **15** : 199–204.

Results of varietal trials of rice and banana are reported. Selections made from clonal progenies and hybrid seedlings of *Coffea arabica* and *C. robusta* are undergoing further trial.

1335. **Third Annual Report of the Research Department of the Indian Coffee Board 1949-50.**
1951 : Bull. No. 3 : Pp. 51.

The continuation of controlled hybridization between desirable parents is reported. Details are given of interspecific and intraspecific crosses between vigorous high yielding types of *Coffea arabica* and *C. robusta*. Many promising selections were made; some have been selfed while others are undergoing further trial.
Following recent recommendations of a committee appointed by the Indian Coffee Board, certain clones which have given consistently high yields over a number of years are being propagated vegetatively; comparative trials of

selected clones are in progress. Vigorous strains are also being collected from private estates to supplement breeding material at the research stations.

1336. CHEVALIER, A.
Les caféiers de l'Oubangui-Chari et du Congo français et l'amélioration de leur culture. (**The coffee trees of Oubangui-Chari and of the French Congo and the improvement of their cultivation**).
Rev. Bot. Appl. 1951 : **31** : 353–67.

The cultivated and wild coffee species in the above two regions are enumerated with a note on the so-called false coffees *Psilanthus Mannii* and *Belonphora lepidopoda*, of the Oubangui-Chari basin.

1337. SACCAS, A. M.
La trachéomycose (carbuncularioše) des *Coffea excelsa*, *neo-Arnoldiana* et *robusta* en Oubangui-Chari. [**Tracheomycosis (carbunculariosis) of *C. excelsa*, *neo-Arnoldiana* and *robusta* in Oubangui-Chari**].
Agron. Trop. 1951 : **6** : 453–506.

Coffee lines or hybrids resistant to *Fusarium xylarioides*, which causes tracheomycosis in coffee plantations in French East Africa, are required. The Central Station of Bonkoko has already abundant plant material for large scale research. Though it may be difficult to find resistant lines of *C. excelsa* and *C. neo-Arnoldiana*, promising lines of *C. robusta* have been found.

1338. **Report of the Cocoa Conference held at Grosvenor House, London, W.1 11th to 13th September 1951** : Pp. 152.

Henderson, F. C. The expansion of cocoa growing in Papua—New Guinea. (*pp. 26–32*).

The research programme at the Keravat Experiment Station is outlined. Although most plantations were cut down and all past records lost during recent Japanese occupation, sufficient Trinitario material has been preserved to form a basis for breeding without introducing foreign strains. Selection of desirable mother trees, compatibility studies, controlled hybridization and progeny trials have begun again. Several promising selections breeding true to type have already been made.

Voelcker, O. J. and Berwick, E. J. H. Cocoa planting material for Malaya. (*pp. 34–38*).

Many recently introduced specimens of the Trinitario, Amelonado, Criollo and Upper Amazonian varieties are undergoing trials for adaptation to Malayan conditions and ability to transmit desirable characters to seedling progenies.

Bowman, G. F. The Inter-American Cacao Center at Turrialba, Costa Rica. (*pp. 40–56*).

A survey of work carried out at Turrialba includes a description of selection techniques. In an attempt to discover a method for estimating the yielding capacity of a mature tree while it is still young, detailed observations are being made on clonal progenies of trees varying in yielding capacity; it is hoped that some readily recognizable criteria characteristic of high yielding trees will facilitate future selection. Pollination studies recently undertaken have shown significant differences between clones in respect of pollen viability.

Shephard, C. Y. A Progress Report on Cocoa Research at the Imperial College of Tropical Agriculture. (*pp. 58–63*).

At River Estate, offspring from crosses between ICS clones and Amazonian strains with immunity from witches' broom are being tested for reaction to the pathogen. Criollo introductions from Nicaragua are undergoing adaptability trials. Progenies arising from selfings of two parent trees were shown to be less vigorous than those produced by crossing the same trees. Statistical data indicate a higher seed set from early morning hand pollinations than at any other time of day. Inheritance of self sterility is being studied among progenies of self fertile and self sterile clones. Hybridization is in progress between widely different types of *Theobroma* in an attempt to synthesize a type similar to the Trinitario variety.
Outstanding virus-free selections have been made from the sixteenth randomized block experiment with promising clones. Numerous F_1 seedlings from open-pollinated ICS pods are being grown under observation; it is hoped that some will prove commercially acceptable and free from virus infection. There is no evidence that the expression of leaf symptoms is correlated with the degree of susceptibility to the virus; all clones tested so far are equally susceptible.

de Witt, K. W. and Cope, F. W. Notes on the quality factor in Trinidad cocoa. (*pp. 64–68*).

Section II, dealing with selection for flavour, stresses that the fermentation technique is almost as effective as genetical determinants in controlling flavour. When a standard method

has been devised for preparing test samples, studies on the inheritance of flavour will begin with an investigation of the effect of the pollen parent on flavour; tests will be carried out on beans arising from self pollination, open pollination and cross pollination. Correlation between flavour and bean colour will also be investigated among progeny segregating in respect of the latter character.

Johns, R. and Gibberd, A. V. A review of the cocoa industry of Nigeria with special reference to the control of swollen shoot disease and the maintenance of production by rehabilitation and new planting. (*pp. 135–43*).

Reference is made to the establishment of plantations of desirable seed trees at Ibadan and Akure to provide improved seedlings for growers. Clonal propagation of selected high yielding types is also being carried out at Ibadan.

1339. URQUHART, D. H. and DWYER, R. E. P.
Prospects of extending the growing of cacao in Papua and New Guinea.
Cadbury Brothers, Bournville 1951 : Pp. 39.

The report includes a discussion of the kinds of cocoa required by the industry and the types of cacao which should be grown in New Guinea and Papua to meet these requirements. It also draws attention to past breeding work at the Keravat Station, New Britain, and suggests the lines along which future breeding should be directed. Appendix 1, consisting of Notes on cacao at Keravat Low-level Experiment Station by F. C. Henderson, provides a short account of breeding at this station. The selections under observation consist of a wide range of hybrid material, from near Forastero to near Criollo. Factors considered in selection comprise: yield, quality, disease and pest resistance, interstrain and self compatibility, and bark characteristics. Evidence of an association between bark characteristics and borer resistance has been obtained; trees with smooth bark are apparently not attacked by *Pantorhytes*.

1340. URQUHART, D. H.
Prospects of the growing of cacao in the British Solomon Islands with notes on Malaya, Ceylon and Java.
Cadbury Brothers, Bournville 1951 : Pp. 44.

Reference to cacao types in the above countries is included. Introduction of seed of high yielding, early maturing, disease free hybrid selections from the Keravat Agricultural Station, New Britain, into the Solomon Islands is recommended. A fairly wide range of planting material is available in Malaya; promising trees are being subjected to controlled pollination by the Department of Agriculture; an extended breeding programme is advocated. It is considered that in Ceylon selection of existing trees will yield superior types; the possibility of introducing strains for testing should however also receive attention.

1341. POSNETTE, A. F.
Progeny trials with cacao in the Gold Coast.
Emp. J. Exp. Agric. 1951 : **19** : 242–52.

The results of 12 years' work of improvement by controlled pollination between selected parent clones are summarized. Although the Amelonado variety, widely grown in West Africa, was thought to be well suited to the region, the progeny of a Trinitario selection, E 1, has proved superior in yield and bean size; a Nigerian selection, N 38, has equalled Amelonado types on poor soils. Introductions from Trinidad have shown adaptability to West Africa; an Upper Amazon strain, Nanay x Parinari, gave an average yield of 38 pods per tree after 5 years, compared with 1·2 pods from its Amelonado contemporary. Relative bean qualities have not yet been determined.

Positive correlation exists between the pod weights of Trinitario clones and of their seedling progenies.

1342. POSNETTE, A. F. and TODD, J. M.
Virus diseases of cacao in West Africa. VIII. The search for virus-resistant cacao.
Ann. Appl. Biol. 1951 : **38** : 785–800.

The results of ten years' research on resistance to swollen shoot disease are presented. Some selections made from West African Amelonado showed tolerance of artificial virus inoculations, and were found to have been previously infected with a mild strain of the virus; subsequently, other mild strains conferring protection against virulent strains were isolated. There were no indications that the emergence of mild strains from the virus complex was induced by particular host genotypes.

Resistance to primary infection by *Pseudococcus njalensis* has only been found in cacao from the Upper Amazon region of Ecuador. Genetical resistance among these types is greatest in forms from the Nanay peninsula. Other sources of resistance to the vector were found among the *Herrania* section of *Theobroma*; the possibility

of incorporating these species in the breeding programme is mentioned.

1343. Papadakis, J.
Posibilidades agrícolas de la remolacha azucarera, amapola y guayule en la República Argentina. (Agricultural possibilities of sugar beet, poppy and guayule in the Argentine Republic).
Minist. Agric. Ganad., B. Aires 1951 : Pp. 27.

Selection for morphine content is to be made in poppies.

1344. Heilbron, I.
Brewing Industry Research Foundation. Fourth Progress Report.
J. Inst. Brew. 1951 : **48** : 322–26.

Work on the genetic control of yeast flocculence is to be continued at the Brewing Industry Research Foundation, Lyttel Hall, Nutfield, Surrey, England. Other projects include: comparative analysis of the chemical constituents of hop varieties; study of the changes in carbohydrates of barley during malting, mashing and fermentation, using different varieties; and quantitative analysis of the protein constituents of barley varieties.

MINOR CROP PLANTS

1345. Maĭčenko, Z. G.
(New varieties of muscat sage).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 5 : p. 69. [Russian].

New varieties of *Salvia*, S–24 and S–28, have been selected at the Crimean Research Breeding Station of Essential Oil Plants. Both varieties show resistance to cold and drought and are more productive than the standard V–1.

1346. Martin, J. A. and Crawford, J. H.
Several types of sterility in *Capsicum frutescens*.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 335–38.

Plants which are completely sterile, male sterile under field conditions or male sterile in the greenhouse have been discovered at the South Carolina Experiment Station. Work is in progress to devise means of using male sterile plants for developing good quality hybrid seed on a commercial scale.

1347. Smith, P. G.
Deciduous ripe fruit character in peppers.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 343–44.

At the University of California investigations are in progress with Chili Piquin, one of several Mexican and Central American varieties of *Capsicum annuum* bearing fruits which are readily separated from their woody calyces when ripe. Data from crosses with varieties of *C. annuum* having nondeciduous fruits (Mexican Chili and California Chili) show that the economically desirable deciduous characteristic is determined by a single dominant gene, designated *S*. Four interspecific crosses involving varieties of *C. annuum*, *C. frutescens*, *C. pendulum* and *C. chacoense* produced F_1 plants with deciduous fruits, indicating that the characteristic may be controlled by dominant genes in other species.

1348. Baldini, E.
Contributo ad una descrizione e classificazione sistematica delle razze di peperone coltivate in Italia. (A contribution to a description and systematic classification of the races of peppers grown in Italy).
Riv. Ortoflorofrutticolt. Ital., Firenze 1951 : **35** : 226–40.

To meet the needs of Italian breeders, the writer has elaborated a botanical classification of the red peppers grown in Italy and advocates a genetic study of the numerous populations at present sold on the Italian market as varieties of high quality. Illustrations accompany the text.

1349. Smith, P. G., Rick, C. M. and Heiser, C. B. (Jun.).
***Capiscum pendulum* Willd., another cultivated pepper from South America.**
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 339–42.

Several varieties of this species, previously unknown to many plant breeders, are described. Although *C. pendulum* resembles other *Capsicum* species by having a haploid chromosome complement of 12 it has proved sterile in attempted crosses with *C. frutescens* and *C. pubescens*. One hybrid has been obtained by embryo culture from *C. annuum* x *C. pendulum*.

1350. Krishnamurti, T. S.
Rape and mustard.
Indian Fmg 1951 : **1** : No. 6 : 15–16.

A table is included giving information on improved strains of rape and mustard in India.

1351. Krishnamurty, T. S.
Improved varieties of oilseeds—castor.
Indian Fmg 1951 : **1** : No. 8 : 18–20.

Tabulated descriptions are given of 22 new varieties of *Ricinus communis* developed at

research centres in Hyderabad, Madras, Mysore, Madhya Pradesh, Uttar Pradesh and Bombay for particular environments. Varieties combining early maturity with high yielding capacity and high oil content comprise TMV 1, HS 1 and 2, S 20, T 3 and EB 9, 16 and 31. Other high yielding varieties of medium or late maturity include L 73, 74 and 77 and TMV 2 and 3; the latter has an exceptionally high oil content. L 280 is an early drought resistant type; L 53, 54 and 242 possess a high degree of drought resistance, but are late maturing. The remaining varieties, HS 3, 4, 5, 6 and 7, show yield improvements over local strains.

1352. De Menezes, O. B.
(The axillary bud of the inflorescence in artificial pollination of the castor oil plant).
Rev. Agric., S. Paulo 1951 : **26** : 239–46.

The removal of the axillary bud, which facilitates bagging, was found to reduce the set of fruits. Seed production was reduced more by violet or yellow coloured bags than by light grey.

1353. Shimamura, T. and Kobayashi, T.
(Artificial polyploids of sesame).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : p. 29. [Japanese].

A detailed comparison is reported between colchicine-induced tetraploid sesame and three standard Japanese varieties.

1354. Cruickshank, I. A. M.
Resistance of linseed and linen flax varieties to flax rust (*Melampsora lini*) in New Zealand. Part I.
N.Z. J. Sci. Tech. 1950 : **31** : Sect. A : No. 6 : 54–57.

Data are presented on the relative rust resistance of 14 linseed and 7 fibre varieties in greenhouse trials. The most resistant linseed varieties were Sheyenne, Golden Viking and Punjab; the fibre varieties Stakhanovetz [Shock-worker], D–83, 806–3, Wada, Cascade and Argentine II also showed a high degree of resistance.

1355. Cruickshank, I. A. M.
Resistance of linseed and linen-flax varieties to flax rust (*Melampsora lini*) in New Zealand. Part II.
N.Z. J. Sci. Tech. 1951 : **33** : Sec. A : No. 2 : 62–64.

Linseed varieties which had previously exhibited a high degree of rust resistance in glasshouse trials (cf. Abst. **1351**) were also found to be highly resistant in a field survey during the season 1948–49. Among the 21 linseed varieties tested for the first time in further glasshouse trials, Ottawa 770B, Argentine Selection (CI 462), B 5128, Tammes Pale Blue and Morye were highly resistant; the high degree of resistance already shown by the linseed Sheyenne and by the fibre varieties Stakhanovetz [Shock-worker], D–83, 806–3, Cascade, Wada and Argentine II was confirmed.

1356. Blackman, G. E. and Bunting, E. S.
Studies in oil-seed crops. I. Factors controlling seed production in linseed (*Linum usitatissimum*).
J. Agric. Sci. 1951 : **41** : 256–70.

Results of 25 field experiments, carried out at various centres in England between 1941 and 1946, to assess the factors determining yield and seed composition, are reported. Royal was the most productive of 10 varieties tested, yielding 25% more than La Plata; Bison yielded slightly less than Royal. The earliest and most evenly ripening variety, Redwing, yielded only a little more than La Plata. Environmental conditions favoured a high average oil content of 40–42% for Royal, Bison and La Plata, while Redwing and Buda, small-seeded varieties, contained 38–40%.

Earliness of ripening also influences choice of varieties, particularly in northern England. An average of 16 days elapsed between the maturity of Redwing and the latest variety, La Plata. Redwing and Bison, with flowering periods of 10–12 days, are preferred to Royal and La Plata (18 and 20 days respectively).

The obvious advantages of developing varieties earlier than Royal and of equal productivity are briefly mentioned with reference to the current breeding programme.

1357. Tušnjakova, M. M.
[Vegetative grafts of sunflower (*Helianthus annuus*) on the Jerusalem artichoke (*H. tuberosus*)].
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 37–46. [Russian].

Grafts of sunflower on Jerusalem artichoke were more vigorous than sunflower plants and their seed had a higher oil and a lower husk content. The first, second and third seed generations combined the vigour of *H. tuberosus* with the earliness and productiveness of *L. annuus*. Jerusalem artichoke lost, partially or completely, the capacity for development of tubers.

Loss of vigour occurred in some hybrids in their third grafted generation. This is attributed

to degeneration similar to that occurring in inbred material.

1358. Kuzjmin, V. P.
(A sunflower variety, Šos-41).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 5 : 34–36. [Russian].

Open pollination of a local Atbasarskiĭ sunflower with varieties from other districts and mass selection, conducted for several years at the Šortanda Agricultural Research Station, Kazahstan, have given a new variety, Šos–41.
It is earlier and more productive and has higher oil and lower husk content than the standard Saratovskiĭ 169 [Saratov 169]. The percentage of seed with a phytomelan layer in the new variety is as high as in the standard. Šos–41 shows resistance to *Homeosoma nebulella* and a low degree of susceptibility to *Orobanche, Sclerotinia* and rust. The variety has a medium tall stem, a nonshedding and grey striped seed of the oil type.

1359. Ustinova, E. I.
(Embryological analyses of sunflower ovaries after pollination with a pollen mixture).
Agrobiologija (Agrobiology) 1951 : No. 3: 104–13. [Russian].

The differences in the development of reproductive organs of Ždanovskiĭ 8281 [Ždanov 8281], when selfed, or pollinated with mixed pollen of Fuksinka and Gryzovoĭ [Chewing], or the pollen of these varieties and self pollen, were investigated at the Moscow State University. The results of embryological analyses are discussed from the Mičurinite point of view on fertilization.

1360. Šimanskiĭ, N. K.
(Intervarietal hybridization of the sunflower).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Sci. USSR) 1951 : No. 9 : 10–16. [Russian].

The effects of intervarietal hybridization upon the economic properties of sunflower were studied at the USSR Institute of Breeding and Genetics, Odessa. The principal aim was the improvement of the standard Ždanovskiĭ 8281 [Ždanov 8281].
Hybrids resulting from open pollination of that variety grown in a field with the VNIIMK* varieties 4418, 3519, 4036, 1813 and 1646 showed greater vigour and higher yield than the controls.
Seed analyses showed that open pollination had the effect of increasing the oil and reducing the husk contents in Ždanovskiĭ 8281 and VNIIMK 4036, of lowering oil and increasing the husk ratio in VNIIMK 4418, of increasing the husk content of VNIIMK 3519 without altering its oil content, and of increasing both the oil and the husk contents in VNIIMK 1813 and VNIIMK 1646.
The hybrids transmitted their greater vigour and productiveness, larger size of seed heads and heavier 1000 seed weights to later generations. Similar results were obtained when Ždanovskiĭ 8281 was open-pollinated by VNIIMK 1646, 6540 and 8931, 309p and G–409.

1361. Ljaščenko, I. F.
(Intervarietal hybrids of sunflower).
Agrobiologija (Agrobiology) 1951 : No. 4 : 107–10. [Russian].

The effect of hybridization and Mičurinite training upon the vitality of the sunflower was studied at Rostov. The F_1 obtained from various crosses grew taller and had larger seed heads than the initial varieties. This was the more remarkable as some hybrids were more susceptible to *Orobanche* than their parents. A variety showing resistance to *Orobanche*, 7612, and two varieties tolerant of *Orobanche*, Stepnjak and Armavirskiĭ 1813 [Armavir 1813], were involved as female parents in some of the crosses. The most productive and vigorous hybrids were obtained in the second generation by open pollination. Reference is made to similar heterotic effects observed in vegetative hybrids.
Training Saratovskiĭ 169 [Saratov 169] and Kruglik 3519 upon saline soil, under conditions of infection with *Orobanche* and late sowing, has increased their vigour. The first seed generation gave tall plants which had larger seed heads and were tolerant of *Orobanche*.

1362. Vostrikova, A. I.
(The pollination of the oil poppy).
Agrobiologija (Agrobiology) 1951 : No. 3 : 143–46. [Russian].

The effect of selfing, artificial cross pollination and open pollination upon the yield of Barnaulskiĭ 432 [Barnaul 432] was investigated at Leningrad. In experiments on cross pollination

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and free pollination, variety Čišminskiĭ 1 was also involved. The selfing involved polliantions with pollen from the same flower, and pollen mixtures from the flowers of the same plant, from flowers of another individual and from those of several individuals. It was found that the F_1 obtained by open pollination was the most productive. Other productive progenies were derived from pollinations with mixed pollen of one or several individuals of the same variety and from cross pollinations with mixed pollen of several plants of Čišminskiĭ.

1363. Baldwin, J. T. (Jun.) and Speese, B. M.
Chromosomes of certain West African plants.
Va. J. Sci. 1951 : **2** : p. 315. (Abst.).

Reference is made to chromosome determination in several genera including *Physalis, Strophanthus* and *Tacca.*

1364. Thomas, C. A.
Anthracnose of *Digitalis*.
Phytopathology 1951 : **41** : 997–1000.

Considerable differences in degree of susceptibility to *Colletotrichum fuscum* were noted among five species of *Digitalis* grown at Beltsville, Md.; *D. sibirica* and *D. purpurea* were most resistant.

1365. **Report of the Work of the Rubber Research Board in 1950.**
Rubb. Res. Scheme, Ceylon 1951 : Pp. 64

Data are presented on the yield and girth measurements of numerous seedlings and clonal selections of different ages grown at Dartonfield, Nivitigalakele and Hedigalla.
Pollination has been effected between LCB 870, which is resistant to mildew (*Oidium Heveae*), and high yielding susceptible clones.

1366. Cramer, P. J. S.
Historique de la méthode Testatex. (**The story of the Testatex method**).
Bull. Agric. Congo Belge 1951 : **42** : 655–70.

This method for estimating the productivity of rubber plants by an early trial tapping by means of Cramer's Testatex knife (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 195 and Vol. VII, Abst. 1342) is discussed in detail. The advantage of early elimination of inferior plants as a means towards increasing the average productivity is stressed and the efficiency of the method in classifying families of plants of clonal seedlings is exemplified.

1367. Čeremisinov, N. A.
(Mičurinite science is the foundation upon which control measures against the diseases of kok-saghyz may be developed).
Priroda (Nature) 1951 : No. 6 : 30–38. [Russian].

Several varieties of *Taraxacum Kok-saghyz* were tested at the Kursk Scientific Research Institute of Rubber Plants for their resistance to rust, mildew, white root rot, soft rot and wilt.
Varieties 485 and 1533 showed the highest degree of resistance to rust and mildew. Variety 666 was the least susceptible to both forms of root rot. Tetraploidnyĭ [Tetraploid], bred by Navašin, proved highly susceptible to rust and Veliko-Alekseevskiĭ to rust and the root rots.

FRUITS AND NUTS

1368. Granhall, I.
Mutationsförädling av fruktträd. (**Mutation breeding of fruit trees**).
Nord. JordbrForskn. 1951 : **31-32** : 401–11.

Spontaneous mutations, the cytological and chemical basis of mutation, and genome, chromosome and gene mutations in fruit trees are discussed, with numerous examples from experiments made at Alnarp and Balsgård in Sweden (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1150).

1369. Larsson, G.
Fruit growing in northern Sweden.
Plants and Gardens 1951 : **7** : 180–81.

Adaptability trials of Russian, Finnish, Canadian, Norwegian, English and Swedish varieties of apple, raspberry, black currant, gooseberry and strawberry carried out at the Öjebyn State Experimental Farm, Sweden, since 1946 are summarized; a combination of winter hardiness and early maturity is desirable.

1370. Taylor, H. V.
Masters Memorial Lectures, 1951. Fruit varieties and production in Masters' times contrasted with modern kinds and methods.
J. R. Hort. Soc. 1951 : **76** : 384–91; 429–37.

A comparison made between lists of apple and strawberry varieties widely grown in Britain in the nineteenth century and popular modern varieties reflects many changes in the preferences of the consumer.
Development of British research on incom-

patibility relationships in tree fruits, with respect to choice of pollinating varieties for commonly grown apples, pears, plums and cherries, is briefly reviewed. Absence of references to this problem in Victorian literature may be due to the practice of growing numerous varieties, so that cross pollination was easy.

1371. Zelenskiĭ, M. A.
(The effect of the pollinating variety upon hybrid seedlings).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 9 : 75–76. [Russian].

At the Ukrainian Horticultural Research Institute, the apple Beljfler Kitaĭka [Bellefleur Chinese Crab] produced large uniform fruits, each containing 5 seeds, when crossed with Renet Simirenko [Simirenko's Reinette]. The fruits resulting from open pollination of this variety with several others were smaller and contained more seeds.
Similar effects of specific pollen were observed upon the pear hybrids Lesnaja Krasavica [Forest Beauty] x Tolstobežka [Thick] and Williams x Petronovka.

1372. Özbek, S.
Önemli meyva türlerimizde istihsalin standardizasyonu ve standart çeşitlerin meyva vasıfları üzerinde araştirmalar.
(Investigations on the standardization of products of the chief fruit varieties and on the qualities of their fruit).
Ziraat Fak. Yayınları, Ankara Üniv. 1950 : No. 13 : Pp. 212.

This monograph is devoted to apples, citrus fruits, figs and nuts. The chief commercial varieties are listed and analyses given of their fruits.

1373. Dermen, H.
Tetraploid and diploid adventitious shoots from a giant sport of McIntosh apple.
J. Hered. 1951 : **42** : 145–49.

Cytological analysis of adventitious buds of a giant sport of the apple McIntosh (cf. *Plant Breeding Abstracts,* Vol. XVIII, Abst. 1810) suggests that this sport arose as a periclinal chimera consisting of $2n$ epidermis, $4n$ outer cortex and $2n$ inner tissues, and later changed into a $4n$ or $4n$–$2n$ mericlinal condition in the inner tissues. One of the four adventitious buds examined gave rise to a wholly tetraploid shoot. A giant sport of Winesap has been found to be a periclinal chimera with $4n$ inner tissues and $2n$ outer cortex and epidermis. An attempt is being made to develop tetraploids from chimeras by the adventitious bud technique, for use in breeding at the polyploid level.

1374. Lisavenko, M. A.
(A vegetative hybrid between Mičurin varieties of apple).
Agrobiologija (Agrobiology) 1951 : No. 2 : 117–20. [Russian].

At Biĭsk, Altaĭ territory, Slavjanka [Slav] grafted on Pepin Šaffrannyĭ [Saffron Pippin] produced a single yellow pink-striped early fruit weighing 70 grm. It had white flesh and contained five well developed seeds. The hybrid differed morphologically from both the initial varieties and is expected to be hardier.

1375. Eggert, F. P.
A study of rest in several varieties of apple and in other fruit species grown in New York state.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 169–78.

Data concerning the termination of bud dormancy in apples indicate that in types which flower early the resting period ends sooner than in mid-season or late blooming varieties. Significant positive correlation was found between the degree of bud activity and accumulated hours of exposure to temperatures below 45° F.

1376. Lavrik, P. I.
(Horticulture in new districts).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 11 : 12–14. [Russian].

Several hardy seedlings and little known varieties of apple found in the Karelo-Finnish SSR are briefly described.

1377. Tjaželjnikov, A. D.
(Breeding large fruited apple varieties for Siberia).
Agrobiologija (Agrobiology) 1951 : No. 3 : 62–68. [Russian].

Several hardy large-fruited apples, 1649(12), 1668(2), 1653(8), 1665(6), and 1661(1) from Ranetka Purpurovaja [Purple Reinette] x Borovinka, 1667(33) from Ranetka Purpurovaja x Beljfler Kitaĭka [Bellefleur Chinese Crab] and Ranetka Purpurovaja x Anis Alyĭ [Scarlet Anis] have been obtained at the Novosibirsk Research Station at Berdsk.
The method consisted of training the hybrids for hardiness upon light soils under Siberian conditions before they began differentiating their reproductive buds. At this stage the hybrids

were transferred to Samarkand to be trained in the warm climate and upon good soils, for development of large fruits. The best material was then selected, and scions prepared from it were sent to Siberia for vegetative propagation upon local rootstocks. Chemical analyses of fruits of the hybrids trained in Samarkand showed that their acidity was reduced to 0·19% and that they contained 22% more dry substance, 16% sugars and 25·58 mg.% vitamin C.

1378. Zacha, V. and Ševčík, Z.
Příspěvek k peniciliové hnilobě skladovaných jablek. (**Notes on *Penicillium* rot of stored apples**).
Sborn. Čsl. Akad. Zeměd. 1951 : **24** : 276–81.

In experiments with apples at Brno, Ontario and Golden Pearmain showed some degree of resistance to rot, caused by *Penicillium crustaceum*.

1379. Bishop, C. J.
A study of male parental influence in crosses with the Northern Spy apple.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 165–68.

The influence of three pollinating varieties, Cox Orange, Ben Nevis and Golden Russet, on the progeny of Northern Spy was analysed at the Dominion Experimental Station, Nova Scotia; variations were observed in fruit size, appearance, colour, russeting, waxiness, flavour, quality, date of maturity and degree of scab resistance.

1380. Blair, C. A. and Groves, J. R.
Biology of the fruit tree red spider mite *Metatetranychus ulmi* (Koch) in south-east England.
J. Hort. Sci. 1952 : **27** : 14–43.

Differences in varietal resistance of apples and plums to *M. ulmi* have been noted. Severe bronzing and abscission of foliage are rare in varieties, such as Bramley's Seedling, which have a double layer of palisade mesophyll; Worcester Pearmain, however, is often severely affected although it has this type of leaf.

1381. Nickell, L. G.
Embryo culture of weeping crab-apple.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 401–05.

A technique of embryo culture, by which dormancy is curtailed and germination occurs soon after seed ripening, has been devised for crab apples at the Brooklyn Botanic Garden. It will thus be possible to determine much sooner whether seedlings have inherited the weeping growth habit of the mother tree.

1382. Šaĭtan, I. M.
(**The effect of external conditions upon results of crosses between fruit trees**).
Agrobiologija (Agrobiology) 1951 : No. 2 : 122–23. [Russian].

Individuals of Sibirka [Siberian Crab], obtained by open pollination, showed individual seasonal differences in their capacity for fruit setting and development of mature fruits when pollinated with mixed pear pollen in 1946, 1947 and 1948.

1383. Filinger, G. A. and Zeiger, D. C.
Hardiness studies of some French crab rootstock selections.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 145–49.

Variation in hardiness was obvious among crab apple seedlings undergoing freezing treatment and injury determination by the electrical resistance method at Kansas Agricultural Experiment Station. Yellow Siberian and Manchu Crab were used as frost resistant standards for comparison.

1384. Una doppia novità frutticola. (**A two-fold novelty in the fruit world**).
Agricoltura Tosc. 1951 : **6** : 418–19.

The new pear Santa Maria (cf. Abst. 1385) just released to Italian growers is described. The second novelty is the introduction in Italy of the use of a seal attached to stocks as a guarantee that they are genuine.

1385. Morettini, A.
Santa Maria—incrocio Morettini William x Coscia 29. (**Santa Maria—a Morettini hybrid, William x Coscia 29**).
Riv. Ortoflorofrutticolt. Ital., Firenze 1951 : **35** : 173–84.

Morettini, A.
Una nuova pera estiva. (**A new summer pear**).
Ital. Agric. 1951 : **88** : 557–64.

A general review is given of pear breeding and selection in Italy and abroad. The author's own new hybrid variety Santa Maria is then described; the tree is vigorous and productive and is intermediate between the parents as regards ripening time. The pears, which have a good flavour, are medium-sized and store well.

1386. Mileško, A. F.
(Breeding pear under conditions of the south).
Agrobiologija (Agrobiology) 1951 : No. 3 : 82–88. [Russian].

Hybridization between productive, long-lived adapted Crimean varieties such as Kabak armud [Pumpkin pear] (= Iljinka [Iljin's]), Miski [Musk], Šipan Kertme (Španka) and Hyš armud, and European pears at the Crimean Zonal Fruit Research Station is reported. Some promising material, including the hybrids Hyš armud x Beurré de Bosc, and Hyš armud x Olivier de Serre, has been obtained.
The hybrids from wide crossing proved hardier and more vigorous and more adapted than the initial material. However, in respect of their keeping properties most hybrids resembled the parent producing the more perishable fruits. The fruit quality of the European varieties was transmitted to the hybrids, provided the latter were trained upon good soil and sheltered.
Saint Germain showed promise as a female and Beurré de Bosc both as a male and female parent, in crosses with hardy local varieties.

1387. Karanjan, P. G.
(Breeding pears for the alpine zone of Armenia).
Agrobiologija (Agrobiology) 1951 : No. 3 : 89–93. [Russian].

Pear breeding at the Institute of Fruit of the Academy of Sciences of the Armenian SSR, Leninakan, is described. The most promising hardy pears with good quality fruits have been bred from Lesnaja Krasavica [Forest Beauty] x Bere Zimnjaja Mičurina [Mičurin's Winter Beurré]. Descriptions are given of hybrids 2/2, 2/3 and 2/4 from the above cross, which have been named Gornaja Krasavica [Mountain Beauty], Pamjatj Mičurina [Mičurin's Memorial] and Elena [Helen] respectively.
Reference is made to some hybrids, derived from *Pyrus salicifolia*, showing resistance to drought.

1388. Siebs, E.
Über die Schorfanfälligkeit von Birnen und die Aussichten auf ihre Resistenzzüchtung. **(On the susceptibility of pears to scab and the prospects of breeding for resistance).**
Phytopath. Z. 1951 : **18** : 270–86.

Though most varieties of pears are susceptible to scab (*Venturia pirina*), it should be possible to breed resistant forms, since some varieties do possess marked resistance. The present paper mainly concerns preliminary infection tests, but the results also showed that under open pollination, perry varieties, which are closer to the wild type, transmit resistance much more strongly than cultivated varieties. One susceptible cultivated variety produced a relatively high number of resistant seedlings.

1389. Rjabov, I. N.
(Breeding stone fruits).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 11 : 22–26. [Russian].

The results of breeding work with stone fruits at the Nikita Botanical Gardens, Crimea, are reported. During the period 1928 to 1948 many varieties of apricot, plum, cherry and peach were developed and some of them were made standards. The methods included wide crossing, selection of local varieties and use of mentors. The most recently added technique consists of training hybrid material and recently developed varieties for hardiness by planting them in clusters and by facilitating open pollination.
Plums. Eight new varieties, obtained by hybridization between local forms of *Prunus cerasifera* and Burbank and Vixon plums are described. They are vigorous, early bearing, productive and resistant to pests and diseases. Their fruits weigh between 28 and 40 grm. and their flavour is good.
Cherry. The best of the 24 new varieties, which are being tested in the Crimea and the Northern Caucasus, are described. Some of these reach maturity in May, others at the end of June.
Peach. Descriptions of fourteen dessert and ten processing varieties are given. They are productive and the quality of their fruit is good. Some varieties reach maturity in July, others as late as November.

1390. Konstantinov, P. K.
(Progress in horticulture in the Ukraine).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 11 : 7–10. [Russian].

Over thirty new varieties of various fruit trees, including several apples, have been recently developed in the Ukraine. A hardy and productive apricot Baĭrak, and a peach Kievskiĭ Ranniĭ [Kiev Early], were bred at the Ukrainian Scientific Research Institute of Horticulture and three hardy large fruited cherries selected at the Mleev Scientific Research Station of Horticulture.

1391. Day, L. H. and Serr, E. F.
Comparative resistance of root-stocks of fruit and nut trees to attack by a root-lesion or meadow nematode.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 150–54.

At the California Agricultural Experiment Station, varieties of plum, cherry and peach differed in degree of susceptibility to *Pratylenchus vulnus*; Macedonian Wild (*Prunus cerasifera*), Etter's Best (*P. subcordata* x *P. domestica*) and Bruce plums, the cherry variety Mahaleb and the peaches Bokhara and Yunnan 55885 maintained vigorous tree growth and showed only slight root injury.

1392. Grosjean, J.
Kruisingsproeven bij pruimen. (**Hybridization experiments with plums**).
Meded. Direct. Tuinbouw 1951 : **14** : 744 52.

With the ultimate object of obtaining plums resistant to silver leaf (*Stereum purpureum*), crosses were made between cultivated plums and the two resistant wild species *Prunus insititia* and *P. spinosa*, as well as *P. cerasifera*, which is rarely attacked.
Suitable methods of emasculation, pollination, isolation and embryo culture were devised. As far as can be judged at this stage, some of the experimental seedlings appear to show greater resistance than their plum parent.

1393. Bernhard, R., Delmas, H.-G. and Sanfourche, G.
Recherches sur la pollinisation de quelques variétés de pruniers. (**Research on the pollination of some varieties of plum trees**).
Ann. Inst. Nat. Rech. Agron. 1951 : **1** : Sér. B : 179–209.

In a review of the causes of morphological, chromosomal and factorial sterility, pollination is discussed from the standpoints of varietal self fertility, intercompatibility and self sterility, and a general interpretation on the basis of East's theory is favoured. Incidentally, it was found that (i) 12–15 days after blooming, the percentage set (nouaison) or the number of flowers in which the ovary had begun to develop was not related to the number of flowers originally fertilized; and (ii) metaxenia was not the cause of the differences in fruit weight observed in a number of plum crosses made at the Station de Recherches Viticoles et d'Arboriculture Fruitière du Sud-Ouest.

1394. Roberts, A. N. and Hammers, L. A.
The native Pacific plum in Oregon.
Sta. Bull. Ore. Agric. Exp. Sta. 1951 : No. 502 : Pp. 22.

Variability of *Prunus subcordata* is described with notes on numerous selections made from wild thickets since 1943 ; these selections vary in date of maturity and some bear fruit of high quality suitable for making preserves. All selections are self sterile; fruit-setting capacity of different crosses is being determined.

1395. Haritonova, E. N.
(**The relation between productiveness and pollen viability in the cherry, in *Prunus avium* and in their hybrids**).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 8 : 25–33. [Russian].

Investigations made at the Central Genetical Laboratory, Mičurinsk, established a direct relation between yield and pollen viability in wild species, cultivated varieties and hybrids of cherry. The material included some hybrids bred at the institute from *P. Cerasus* x *P. avium*. Hybrids with over 50% viable pollen proved productive.

1396. Monin, A.
Description et identification des variétés de cerisiers. (**The description and identification of varieties of cherry trees**).
Rev. Agric., Bruxelles 1951 : **4** : 1481–96.

General principles are given for identifying cherries with special reference to those in cultivation in Belgium and to their quality and economic value. There are also two sections on the botanical origin and classification of the main varieties grown in Europe and on misnomers. Chromosome numbers of various *Prunus* species are given with observations on the possible mode of origin and interrelationships of some of the constituent groups, such as the amarelles.

1397. **Peaches and nectarines bred and tested in New Jersey.**
N. Jersey Peach Coun. Inc., N. Brunswick, Fall, 1951–Spring, 1952 : Pp. 3.

One new peach variety, Envoy (NJ 102), is added to previous lists (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 496, and Vol. XX, Abst. 516). It is an early, yellow-fleshed freestone peach, especially suitable for freezing. Envoy has given a good performance in Canada

and is recommended for local markets in northern peach growing areas.

1398. Johnston, S.
The Michigan peach breeding project.
Fruit Varieties and Hort. Digest 1947 : **2** : 39–40.

A programme of research for varieties resembling Redhaven in quality but of larger size and additional winter hardiness is outlined. Fairhaven (J. H. Hale x South Haven) produces fair-sized fruit but the flesh quality is not quite as good as that of Redhaven.

1399. Vasiljcova, T. M.
(Somatic fertilization in citrus fruits).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. **3** : 18–39. [Russian].

The results of Mičurinite investigations of fertilization processes in citrus fruits, which included the fertile orange variety Lučšiĭ Suhumskiĭ [Suhumi Best] and the sterile Washington Navel, are reported. Pollination with a large amount of pollen had the effect of several pollen tubes penetrating the same ovule. Some pollen tubes emptied their contents inside the embryo sac and caused either polyspermy or metabolic interaction. Others grew in the nucellar tissue without reaching the embryo sac and emptied their contents in the peripheral region of the tissues surrounding the nucellus. These male elements were either involved in the metabolic processes, which led to the formation of the so-called "female" cells of the nucellar embryos, or changed, by metabolic interaction, the nutrients available to these female cells. It was found that the "female cells" of the nucellar embryos sometimes developed before the zygote was formed or even when no zygote was formed. In some instances the first cell division of the "female cell" of the nucellar embryo occurred before the first cell division of the zygote.

1400. Klimenko, K. T. and Klimenko, V. N.
(New seedling varieties of citrus fruits).
Agrobiologija (Agrobiology) 1951 : No. **3** : 69–81. [Russian].

Seedling selection involving Mičurinite training for hardiness at the Batumi Botanical Garden is described. As a result of the work, begun in 1938, several citrus seedlings have been obtained which are superior to the initial varieties in respect of hardiness and fruit quality. Descriptions are given of some seedlings which have come into bearing when grown upon their own roots or grafted on the Unshiu mandarin. They include the lemon Novo-Gruzinskiĭ 1031 [New Georgian 1031], seedlings 2521, 2526 and 2520 of the Unshiu mandarin, a seedling of a local orange variety, a seedling of Navel orange and a seedling of the orange variety Old Vini.

The best seedlings of lemon, orange, mandarin and pomelo are being multiplied. Second and third seedling generations are expected to show a greater degree of hardiness and to produce better quality fruit than the first seedling generation.

Several hardy and productive nucellar seedlings of the Unshiu mandarin have been selected. In the Mičurinite view nucellar seedlings may differ from the maternal material as a result of changes in external conditions.

1401. Grant, T. J., Costa, A. S. and Moreira, S.
Tristeza disease of citrus in Brazil.
Calif. Citrogr. 1951 : **36** : 310–11, 324–26, 328–29.

The reactions of numerous varieties of grapefruit, lemon and lime and hybrids of *Citrus trifoliata* to tristeza are discussed.

1402. Maĭsuradze, N. I.
(New varieties of grapefruit and pomelo).
Agrobiologija (Agrobiology) 1951 : No. **4** : 116–20. [Russian].

Several new varieties of *Citrus racemosa* and *C. grandis* have been recently developed at Suhum. The grapefruit hybrids 1642, 7307 and 7314 were bred from the Unshiu mandarin, the crosses involving pomelo 24147 and pomelo 19428 as the male parents. The female parent involved in the crosses which gave the grapefruit hybrids 1537 and 2974, was Azahikan and the respective male varieties were Duncan and Pernambuco. The new varieties are hardy and early and produce good quality fruits. Hybrids 1642, 7307 and 7314 have a low seed content.

The new pomelo Sejanec 19991[Seedling 19991] is a seedling of an introduced hybrid from a pomelo, and pomelo 19428 has been selected in a citrus grove at Kelasuri, Abhazia. Both pomelos produce good quality fruits, those of 19428 containing only few seeds.

1403. Klotz, L. J.
Report on mal secco disease.
Calif. Citrogr. 1950 : **36** : 74–75.

A survey of resistance to mal secco among lemons grown in Sicily and Italy mentions that since 1945 six mutants with some degree of resistance have been discovered among normally susceptible types.

1404. Calavan, E. C.
The incidence of lemon shell bark in budlings from closely related sources.
Phytopathology 1951 : **41** : p. 936. (Abst.).
Extreme variations in susceptibility to shell bark was observed in selections from lines of Blanchard Eureka, Dodge Eureka and Allen Eureka lemons.

1405. Le Riche, F. J. H.
Chemical changes during the development of some guava varieties.
Sci. Bull. Dep. Agric. S. Afr. 1951 : No. 286 : Pp. 16.
The relative changes in acidity, soluble solids, sugars, alcohol-insoluble residues, nitrogen and ascorbic acid content during the development of eight varieties at the Stellenbosch Fruit Research Station are recorded. Ascorbic acid develops slowly at first followed by a later phase of rapid increase; the duration of these two phases varies with different varieties. Early maturing guavas reach the period of rapid increase much sooner than the midseason and late varieties.

1406. Sen, P. K., Mallik, P. C. and Ganguly, B. D.
Hybridization of the mango.
Indian J. Hort. 1946 : **4** : 4–15.
The techniques of cross pollination carried out at the Sabour Horticultural Research Station, Bihar, are described. Details are given of 63 promising hybrid progenies obtained by intervarietal hybridization during three seasons.

1407. Sadana, J. C. and Ahmad, B.
Observations on the carotenoid pigments of the mango fruit.
Indian J. Med. Res. 1946 : **34** : 69–74.
An analysis of carotenoids in ten varieties available in the Delhi market has revealed wide variation in total carotenoid content, ranging from approximately 62μgrm. per grm. in Benares Langra to 30μgrm. per grm. in some of the Delhi desi types. Five pigments have been detected in all varieties examined.

1408. Vitagliano, M.
Sopra il processo di maturazione dei frutti di "*Diospyros Kaki* L.". (**On the maturation process of the fruits of *D. Kaki* L.**).
Ann. Fac. Agr. Portici Univ. Napoli 1949–50 : **18** : 140–51.
In determining the chemical composition of the fruits of Italian and American persimmons, it was found that seedless varieties were richer in glycosides and contained less tannins.

1409. Nieuwe noten en perziken. (**New nuts and peaches**).
Fruitteelt 1951 : **41** : p. 776.
The following successes of the peach and nut breeder L. Karthaus, of Nijmegen, are briefly noted: the outdoor peaches, Kwekersgoud [Breeder's Gold], Dr X, noted for its large fruits (393 grm.), and Bloedkoraal [Red Coral] with fruits weighing 340 grm.; and the walnut varieties Blonde Tros [Light Coloured Bunch], Margriet, Klein Marijn [Little Mary] and Solitair [Solitaire], chosen from 10,000 seedlings from crosses of German, frost resistant walnuts. These Dutch walnuts are frost resistant and productive and come into bearing early, while the well-shaped, good-sized nuts are easily removed from the shell and do not become sour after a year's storage.

1410. Jacoboni, N.
Il noce nell'Umbria. (**The walnut in Umbria**).
Ann. Fac. Agra., Perugia 1949 : **6** : 270–85.
The most widespread varieties are: Commune, a fast growing regular cropper producing nuts and wood of good quality, and resistant to certain parasites; Premice (or Stiacciamano); and Nocione, which escapes spring frost injury by its late flowering.

1411. Serr, E. F. and Forde, H. I.
Comparison of size and performance of mature Persian walnut trees on Paradox hybrid and *J. hindsii* seedling rootstocks.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 198–202.
Juglans Hindsii x *J. regia* hybrids proved better rootstocks than *J. Hindsii* seedling stocks in hillside and valley orchards of California.

1412. Anthony, R. D. and Sherman, L. W.
Opportunities for better chestnuts and walnuts in Pennsylvania.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 191–92.
Methods of selecting promising seedlings are discussed.

1413. Carver, W. A. and Hull, F. H.
Dixie Runner peanuts.
Circ. Univ. Fla Agric. Exp. Sta. 1950 : S–16 : Pp. 3.
Information is given on the performance of Dixie Runner in Florida (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1495). The variety shows superiority in yielding capacity, seed

quality and oil percentage compared with Florida Runner; it also matures 10 days earlier.

1414. Vasconcelos, D. de M. and Schuler, A. L.
Ensáios de variedades de amendoim. **(Tests of groundnut varieties).**
Bol. Secret. Agric. Pernambuco 1951 : **18** : Nos 1–2 : 126–34.

A statistical analysis of the results of tests with 29 varieties indicated that the varieties most suited to conditions in the state of Pernambuco, Brazil, were Rôxo [Red], Cateto, Tatú V–3 and V–72.

1415. Bolhuis, G. G.
De invloed van klimaatsomstandigheden op het uitleveringspercentage, vetgehalte en eiwitgehalte van de aardnoot, speciaal wat betreft de variëteit Schwarz 21. **(The influence of climatic conditions on the percentage of husk to seed, the fat content and the protein content of the groundnut, with special reference to the variety Schwarz 21).**
Landbouwk. Tijdschr., Wageningen 1951: **63** : 735–41.

The variety Schwarz 21, the best all-round groundnut variety in Indonesia, is much used as a standard for comparing yield and percentage of husk to seed, fat content and protein content of the seed of new selections and lines obtained from crosses before releasing them to growers. Comparative data have therefore been collected on the influence of soil and climate, i.e. the eastern and western monsoon, upon the above qualities in Schwarz 21, and are presented here with similar data relating to other varieties mentioned in relevant American literature.

1416. Schaal, W.
New early peanut, developed in Florida, excels other runners.
Crops and Soils 1951 : **4** : No. 1 : p. 31.

Early Runner, a new groundnut originating from a cross between Small White Spanish and Dixie Giant, matures 12–22 days earlier than other commonly grown varieties. Although its plants are small, the new variety produced more pods per acre than either Dixie Runner or Common Runner. The nuts are usually plump and sweet.

1417. C., F. C.
Research progress.
Ceylon Coconut Quart. 1950 : **1** : No. 4 : 35–37.

Preliminary results indicate that coconut palms with early initial flowering give higher yields of copra than those flowering late. The results of 12 years' work have shown that for seed purposes the first and second bunch nuts are of equal value.

1418. Fang, C., Chou, C. and Li, L.
(A preliminary study of the quality of *Euphoria Longana* from Fuchou and Putien).
Fukien Agric. J. 1949 : **11** : 37–42. [Chinese].

The fruits of a series of varieties of *E. Longana* from Fuchou and Putien were analysed for weight, sugar content, pH of the juice and ascorbic acid content; data are also given for ripening date.

1419. Hodgson, R. W.
Report of long-term research on the avocado.
Calif. Agric. 1951 : **5** : No. 12 : 8–11.

Selection and hybridization carried out in California to produce varieties resembling Fuerte but with less tendency to set fruit only in alternate years are outlined. Numerous introductions from Mexico and Central America have been incorporated in the breeding programme.

1420. Slate, G. L.
New small fruits developed at Geneva.
Fm. Res. 1951 : **17** : No. 4 : p. 7.

Raspberry, blackberry and strawberry varieties recently developed at the New York State Agricultural Experiment Station, Geneva, are briefly described. Details of September and Amber raspberries have already appeared in *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1204 and Vol. XXI, Abst. 2134, respectively. The blackberries Hedrick (Eldorado x Brewer) and Bailey are vigorous, winter hardy and productive; both have large firm berries without noticeable cores. Bailey has a slightly sweeter flavour than Hedrick and matures 2 days later. Of the three new strawberries, Essex (Howard x Deutsch Evern) ripens earliest and bears moderate crops of medium-sized berries with attractive appearance and good quality. Empire (Dresden x Sparkle) matures about 10 days later than Essex, producing high yields of large smooth berries particularly suitable for fresh marketing, though not for either canning or quick freezing. A much later variety, Erie (Sparkle x Howard), gives heavy crops of large fruits which are darker in colour than Empire, but equal in quality.

1421. VAARAMA, A.
Om artkorsningsförädling inom släktet *Rubus*. (**On interspecific hybridization as a breeding method within the genus *Rubus*).**
Nord. JordbrForskn. 1951 : **31-32** : 412–17.

Referring to the distribution of *Rubus arcticus* and related forms in the arctic and subarctic tracts of North America as well as in Fennoskandia and Finland proper, the author points to the possible importance of Asiatic and other forms as a source of new gene material for the *Rubus* breeding work in progress in the Horticultural Division of the Agricultural Research Institute at Piikkiö, Finland. Extensive interspecific hybridization has been carried out. The *Rubus Idaeus* crosses with *R. arcticus* show that the ancestral forms of the two subgenera *Idaeobatus* and *Cylactis* from which the above two species derive have evolved mainly through gene and not genome mutations.
The causes of the regional and seasonal sterility noted in *Rubus* are discussed. Defective germination of the pollen grain appears to be an important contributory factor; meiotic disturbances were not frequent (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 1196 and Vol. XIX, Abst. 510).
An important point for breeders is that, though some seeds of F_1 plants of *R. Idaeus* x *R. arcticus* carry sublethal gene combinations and such plants remain dwarf and die the next summer, 30–40% of the seed sown produces viable individuals; also, fertility rises markedly in the F_2.
Unfortunately aroma is also conditioned by a complex gene system which undergoes a similar fate to the sterility genes, but some new types that have been discovered with a predominant, bitter-sour flavour may be useful in industry, where the lack of acid in the raspberry is regarded as a defect. One method tried in the endeavour to retain or reconstitute the gene combination for the aroma of *R. arcticus* is back crossing, but results are not yet available.
Colchicine treatment of hybrids to obtain amphidiploids failed in the F_1 but one amphiploid F_2 plant was obtained and bore fruit. Colchicine treatment is being continued with other material to explore and utilize the possible range of variation in the later generations.
Hybridization has succeeded between the subgenera *Idaeobatus* and *Cylactis*; two triple hybrids, *R. phoenicolasius* x *R. caesius* x *R. saxatilis* and *R. phoenicolasius* x *R. Idaeus* x *R. arcticus* have also been obtained.
A tetraploid *R. plicatus*, found in the Finnish collection, fruits abundantly and is so early that it ripens in southern Finland even in unfavourable years. Its value in a cross with the horticultural raspberry is being tested.

1422. KRONENBERG, H. G. and DE FLUITER, H. J.
Resistentie van frambozen tegen de grote frambozenluis *Amphorophora rubi* Kalt. (**Resistance of raspberries to the large raspberry aphid *A. rubi* Kalt**).
Tijdschr. PlZiekt. 1951 : **57** : 114–23.

In field observations on resistance to *Amphophora rubi* in varieties of raspberries at the Institute for Horticultural Plant Breeding, Wageningen, practically no aphids were found on Malling Landmark and Milton, few on Indian Summer, Newburgh and Viking, while most of the other varieties were infested. Tests with potted shoots confirmed the resistance of Malling Landmark and Milton, but also showed that some of the varieties relatively resistant in the field were not resistant under all conditions, so that field infestation should not be used as a reliable basis for selection.
Resistance is hereditary and the highest percentages of resistant seedlings, 49·11 and 49·15% respectively, were obtained from Milton x Newburgh and from Milton x Viking.
It should also be noted that aphids that do not develop on the green foliage of resistant plants may thrive on old yellow leaves of such plants.

1423. CADMAN, C. H.
Studies in *Rubus* virus diseases. I. A latent virus of Norfolk giant raspberry.
Ann. Appl. Biol. 1951 : **38** : 801–11.

The name raspberry leaf mottle is proposed for a virus recently isolated from Norfolk Giant, in which it is symptomless. This virus is also carried without symptoms by Baumforth's Seedling B, but causes necrosis on *R. Henryi* and mosaic symptoms on *R. saxatilis*, the variety Cumberland of *R. occidentalis* and the red raspberry varieties Chartham, Malling Landmark and St. Walfried.

1424. WOOD, C. A. and BOASE, M.
Fruit variety trials. I. A trial of ten varieties of raspberry at Forfar, Angus.
Scot. Agric. 1951–52 : **31** : 159–67.

Data on yield, growth habit, frost resistance, date of maturity, fruit quality and reaction to processing are presented from four years'

trials. Norfolk Giant, Malling Jewel, Lloyd George and Malling Enterprise combined heavy yields with good quality, while Malling Promise showed superior frost resistance, earliness and high yielding capacity.

1425. Slate, G. L. and Klein, L. G.
Some results from the breeding of red raspberries.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 155–57.

Crosses carried out at the New York State Agricultural Experiment Station between St. Walfried, a Dutch variety of *Rubus Idaeus*, and some American selections have produced vigorous high yielding seedlings; Newburgh x St. Walfried and St. Walfried x NY 16135 [Newburgh x 8123 (Empire x Herbert) x Lloyd George] produced superior offspring from which selections bearing large berries of high quality have been made. Other selections with good fruit quality are reported from crosses involving Lloyd George. The two outstanding *R. Idaeus* varieties, Lloyd George and St. Walfried, are being crossed to obtain additional clones for hybridization with American raspberries. Promising material was selected for breeding late maturing varieties from autumn fruiting strains of *R. strigosus*.

1426. Slate, G. L. and Klein, L. G.
Blackberry breeding.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 158–62.

Breeding work undertaken at the New York State Agricultural Station has attempted to achieve reliability of production under field conditions, freedom from imperfect berries and fruit borne at the periphery of bushes for easy harvesting, in addition to vigour, high productivity, large firm berries of good quality and resistance to diseases. Data are presented on the evaluation of progenies fruiting for the first time in 1949 or 1950.

1427. Zielinski, Q. B. and Galey, D. O.
Chromosome numbers of certain trailing blackberry clones.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 163–64.

An analysis of chromosome numbers of blackberries with decumbent growth habit used for breeding at the Oregon Agricultural Experiment Station has revealed different levels of polyploidy. Several hybrids selected for their high degree of productivity have proved to be aneuploids. Further work is in progress to determine relationships, if any, between chromosome number and plant vigour, fertility and growth habit.

1428. Einset, J.
Apomixis in American polyploid blackberries.
Amer. J. Bot. 1951 : **38** : 768–72.

Somatic chromosome counts made of seedlings from selfed, crossed and open-pollinated polyploids from the subgenus *Eubatus* showed that 80–100% were apomicts with chromosome numbers like those of their seed parents. Although the majority of seedlings were produced from unreduced gametes, numerous seedlings from the tetraploid form ($2n = 28$) possessed only 14 somatic chromosomes.

1429. Nilsson, F.
Arthybrider och tetraploider inom släktet *Ribes*. (**Interspecific hybrids and tetraploids within the genus *Ribes*).**
Nord. JordbrForskn. 1951 : **31-32** : 418–24.

A detailed account is given of many interspecific hybrids of *Ribes*, especially those obtained by Viksne in Latvia (*cf. Plant Breeding Abstracts*, Vol. III, Abst. 274) and by the author in Sweden. Tetraploid forms of various species and interspecific hybrids are also described.
Information is given on the distribution of the species and forms, and on the chromosome number of the genus *Ribes*.
A new tetraploid fertile species with $2n = 32$ has been obtained by colchicine treatment of the hybrid *R. nigrum* x *R. Grossularia*.

1430. Kuzjmin, A. Ja.
(**Suppressed inheritance in distant hybridization of plants**).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. **6** : 18–21. [Russian].

Fertilization was investigated in wide crosses between brambles and between currants and gooseberries at the Central Genetical Laboratory, Mičurinsk.
A method of artificial pollination facilitating the suppression of female inheritance in some hybrids was developed. It consisted of emasculation and artificial fertilization of the flowers with an interval of several days between the two operations. By this time, the female organs of the flower had passed through their mature stage and the egg cells had lost their selective capacity for foreign pollen.
The material studied included hybrids between the red currant variety Kyzyrgan and the black

currant Vosjmaja Devisona [Davison's Eighth], the latter being the male parent. Most hybrids resembled the male parent but produced solitary small, dark red, glossy fruits containing a single seed, which resembled the seed of the female parent. The juice was dark red and had good flavour. The fruits were heavier than those of Kyzyrgan.

Other hybrids produced large and small black fruits with a waxy bloom. These fruits contained 2–6 seed each, resembling those of the male parents. The fruits of the hybrids were larger than those of the standard Lija Plodorodnaja [Productive Lia]. For instance, the 100 fruit weight of triploid seedling 5/37 was 59·6 grm. After open pollination in 1947, 1949 and 1950, hybrid 5/37 gave viable seed, which was planted in the open. All the second generation progenies showed the properties of the P_1 male parent. Several F_2 hybrids produced good quality fruits with a higher sugar content than the initial varieties and the standard Lija Plodorodnaja.

1431. Johansson, E.
Sortförsök med svarta vinbär. (**Variety trials with black currants**).
Medd. Stat. Trädgårdsförsök 1951 : No. 64 : Pp. 26.

Several series of trials begun in 1940 and subsequent dates at 12 different places in Sweden are recorded. Particular attention was paid to yield, time of ripening and quality, including vitamin C content. The varieties tested and their origin are described with remarks on synonyms.

Boskoop jätte [Boskoop Giant] and the highly winter hardy Finnish variety Brödtorp were the earliest ripening, and Baldwin, Wellington XXX and Danish September were late. The last mentioned showed the highest mean vitamin C contents. Brödtorp was generally first in yield in the early years after planting.

1432. Colby, A. S. and Boll, H. L.
Vermilion, a new strawberry variety.
Trans. Ill. Hort. Soc. 1950 : **84** : 148–50.

A further report on the release of Vermilion (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 637) mentions that it was derived from Redstar x Pathfinder.

1433. Schiemann, E.
Offene Fragen in der Gattung *Fragaria*. (**Open questions in the genus *Fragaria***).
Z. Pflanzenz. 1951 : **30** : 464–72.

Diploid species occur throughout the area of distribution, tetraploid species only in central and eastern Asia, the single hexaploid species only in Europe and the octoploids only in America. The size of the plant is in no way related to chromosome number; nor is the branching type of the runners. The following new chromosome numbers are reported: *F. moupinensis*, $n = 14$; *F. nilgerrensis*, $n = 7$; an east Chinese sample (Fr. 1346), $n = 14$; and *F. platypetala*, $n = 28$.

Later observations on *F. nipponica* indicate that the hybrids previously referred to (cf. *Plant Breeding Abstracts*, Vol. VII, Abst. 781 and Vol. XIII, Abst. 648) contained the *viridis* rather than the *vesca* genome. Hybrids have been obtained, though with much greater difficulty, from crosses of *F. vesca* x *F. moschata*; hybrids of *F. vesca* x *F. viridis*, moreover, are 50% sterile, all of which shows that the *viridis* and *vesca* genomes are not identical. The progeny of one of the *F. vesca* x *F. moschata* pentaploid hybrids contained some plants of the maternal type, which were pentaploid with 35 chromosomes, some of the *F. moschata* type, which had 42 chromosomes, and many others with numbers varying from 27 to 33, a number of them resembling *F. orientalis* in type. Studies of this species show it to be an autotetraploid; contrary to reports by Russian investigators it proved to be heterogametic in the ♀ sex. The tetraploid *F. vesca* x *F. moschata* hybrid behaved like the *elaticollina* hybrids and formed 14 bivalents. It was used as pollen parent in back crosses with *F. vesca* and gave 35 plants, all of paternal type, with mostly sterile pollen.

A natural hybrid of *F. vesca* x *F. viridis* gave progeny containing plants identical with *F. vesca*, two sterile triploids and a number of tetraploids of very low fertility, closely resembling artificial autotetraploids of *F. vesca*.

1434. Staudt, G.
Über Fragen der phylogenetischen Entwicklung einiger Arten der Gattung *Fragaria*. (**On problems of the phylogenetic development of some species of *Fragaria***).
Züchter 1951 : **21** : 222–32.

The systematic classification, chromosome numbers and geographical distribution of *Fragaria* species are discussed. So far genetic research shows that all genomes of the species analysed up to the present can be regarded as homologous. *F. orientalis*, *F. moschata* and probably the octoploid species may be taken as autopolyploids.

Species formation seems to have been brought about by genome mutations, followed by gene and chromosome mutations.
The occurrence of multivalents in meiosis in *F. orientalis* and *F. moschata* is probably due to the polyploid origin of these species.
Some inferences regarding phylogenetic evolution of *Fragaria* can, it is suggested, be made from a consideration of the characteristic distribution of species of various grades of polyploidy in particular places in Europe and Asia.
It seems likely that *F. moschata* may have arisen from the species *F. vesca* and *F. viridis* or some species closely related to them.
Difficulties still attach to any attempt to derive the octoploid species from existing polyploids.

1435. GILBERT, F.
The Redcrop strawberry.
Fruit Varieties and Hort. Digest 1949 : **4** : p. 67.
Redcrop, formerly known as NJ 377, has recently been developed at the Agricultural Experiment Station, Rutgers University, NJ. It matures a few days after Pathfinder and yields large firm fruits of attractive appearance and high quality over a long picking season; the fruits are suitable for freezing. Redcrop has so far shown a high degree of resistance to red stele (*Phytophthora Fragariae*).

1436. MILLER, P. W.
Sensitivity of some species of *Fragaria* to strawberry yellows and crinkle virus diseases.
Plant Dis. Reporter 1951 : **35** : 259–61. (Mimeographed).
Specimens of *F. vesca* from different sources, *F. ovalis* and *F. chiloensis* varied considerably in sensitivity to the same strains of yellows and crinkle. A *F. vesca* type from India (PI 166069), *F. chiloensis* and *F. ovalis* were highly tolerant of both viruses. *F. vesca* from Dee, Oregon, differentiates crinkle from yellows.

1437. BAKER, R. E. D. and SIMMONDS, N. W.
Bananas in East Africa. Pt. I. The botanical and agricultural status of the crop.
Emp. J. Exp. Agric. 1951 : **19** : 283–90.
Data are presented on the probable origin of banana varieties grown in the area, based on a collection made in 1948 comprising *Musa acuminata, M. Balbisiana* and interspecific hybrids. Many obvious somatic mutants were found, indicating that East Africa may be a secondary centre of diversity of the genus.

1438. CHANDRARATNA, M. F. and NANAYAKKARA, K D. S. S.
Cultivated varieties of banana in Ceylon.
Trop. Agriculturist 1951 : **107** : 70–91.
The range of variation in cultivated bananas is discussed. A key for identifying 29 varieties, the majority of which are indigenous, is followed by detailed descriptions.

1439. MENZEL, M. Y.
The cytotaxonomy and genetics of *Physalis*.
Proc. Amer. Phil. Soc. 1951 : **95** : 132–83.
A chromosome number of $2n = 24$ was found in all the species and doubtful forms examined, except in three species with $2n = 48$. Significant differences in chromosome morphology were observed between certain groups of species. Data on geographical distribution, naturally occurring intergradation between species, variation in seedling populations raised under fairly uniform conditions and on artificial crossing behaviour are given in considerable detail, with reference to the nature of speciation in *Physalis* and to the evolution of the genus.

1440. ZUBIETJAN, P. A.
(**Scientific research work in viticulture and wine making in Armenia**).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. **9** : 55–57. [Russian].
The methods used for the development of new varieties include interspecific, intervarietal and vegetative hybridization. Existing varieties are being improved by clonal selection. Hybrids selected at the Experimental Base of the Agricultural Section of the Academy of Sciences of the Armenian SSR are mostly productive dessert varieties with varying dates of maturity. Three varieties suitable for wine making have been developed.

1441. SNYDER, E. and HARMON, F. N.
The Cardinal, Calmeria and Blackrose grapes for *vinifera* regions.
Circ. U.S. Dep. Agric. 1951 : No. 882 : Pp. 8.
Detailed descriptions are given of the table grapes Cardinal, Calmeria (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2627) and Blackrose, developed at the US Horticultural Field Station, Fresno, Calif. Cardinal [Flame Tokay x Ribier (Alphonse Lavallee)] has early maturity and bears large, attractive, medium dark red berries with good quality. Calmeria, derived from open-pollinated seed of Ohanes (Almeria),

is late maturing and has greenish yellow fruits which store well. Blackrose [(Damas Rose x Black Monukka) x Ribier] is an early mid-season variety, producing very large, jet black grapes of good quality.

1442. Steingruber, P. and Müllner, L.
Dreissig Jahre Rebenzüchtung. III. (**Thirty years of vine breeding. Part III**).
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1951 : **1** : 135–38.

The results of breeding research, since 1945, at the Klosterneuburg College and Research Institute for Viticulture, Fruit Cultivation and Horticulture, are reported.
A list of promising new productions, comprising varieties for red and white wines, is given in a table showing yields and sugar and acid contents. The best of these new hybrids are to be used in crosses with the aim of obtaining early ripening forms, showing reliable and uniform yields, increased resistance to pests and diseases, especially *Peronospora* and *Oidium*, and having grapes of high quality exhibiting a typical varietal character (cf. Abst. 726).

1443. Levadoux, L.
La sélection et l'hybridation chez la vigne. (**Selection and hybridization of the vine**).
Ann. Éc. Agric. Montpellier 1950 : **28** : Pp. 195.

Part I of this review deals with the systematic status of *Vitis*, the origin of the different species of vines and with ampelography. Part II is concerned with selection, including methods of selection, and its value as a means of improving vines.
Part III treats of hybridization from the following aspects: the study of the flower; genetic principles applied to the vine with special reference to crossing; hereditary transmission of characters for yield and quality and of other morphological and physiological characters; disease resistance mutations; the role of mutants in hybridization; aims and methods of genetics in vine breeding and the techniques employed in hybridization and sowing of seed; and finally vine judging.

1444. Einset, J. and Lamb, B.
Chimeral sports of grapes.
J. Hered. 1951 : **42** : 159–62.

During investigations at the New York Agricultural Experiment Station, sections through meristematic tissues of Eaton grape buds revealed that although the majority of cells were tetraploid ($2n = 76$), all epidermal cells were diploid. The original supposition that Eaton was a tetraploid variety was based on chromosome counts made only from root tips, and on breeding behaviour when selfed or crossed with diploid varieties. Preliminary investigations of other large-berried grapes formerly thought to be tetraploids indicate that many are also periclinal chimeras.

1445. Wagner, E.
Cytologische Untersuchungen über Meiose und Pollenentwicklung weiblicher Rebensorten. (**Cytological investigations on meiosis and pollen development of female vine varieties**).
Chromosoma, Berlin 1951 : **4** : 439–55.

Observations on European and American varieties of *Vitis* spp. and on hybrids between European and American vines showed that all the female vines examined exhibited chromosome disturbances in meiosis and abnormal pollen development in varying degree according to the variety. The anomalies are attributed to the action of a recessive gene or gene complex in the X chromosome, and to a defective spindle mechanism.

1446. de Lattin, G.
Hyperploidie in der Gattung *Vitis*. (**Hyperploidy in the genus *Vitis***).
Naturwissenschaften 1951 : **38** : 531–32.

A plant with $2n = 40$ as opposed to the normal $2n = 38$ was found in the variety Riparia-Colorado (*V. riparia* x *V. monticola*). It is a ♂ with a strong tendency towards hermaphroditism, which is extremely rare in the parental species, suggesting that the duplicated chromosome pair in the hybrid is one of the autosome pairs carrying the ♀ determinants.

1447. Soldatov, P., Haĭdarkulov, G. and Smirnov, K.
(**The sultana varieties in the Samarkand province**).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1951 : No. **9** : 41–43. [Russian].

Clonal selection of vines producing seedless grapes at the Uzbek Scientific Research Institute of Viticulture is reported. Clones of Kismiš Černyĭ [Black Sultana] and Kišmiš Belyĭ [White Sultana], remarkable for their productiveness and the size and quality of the grape, have been selected.

1448. Barjona de Freitas, A. G.
Observações sobre a influência das castas de *V. vinifera* L. enxertadas na emissão radicular dos porta-enxertos. **(Observations on the influence of different races of *V. vinifera* L. on the root production of the rootstocks).**
Agron. Lusitana 1951 : **13** : 89–113.

Three hybrids of *Vitis riparia* x *V. rupestris* were used as rootstocks for a number of varieties of *V. vinifera*. Hybrid 3306 caused the greatest vegetative development in the scions. Among the varieties used as scions, Tinta Miúda [Small Red] was more vigorous in development than the rest. The rootstock varieties varied in their capacity for root formation, hybrids 101–14 and 3306 being the best; the scion varieties also exerted a marked influence on the root development of the stocks, the varieties Trincadeira, Tinta Miúda and Vital causing more root development than Diagalves and Alicante Tinto [Red Alicante]. Certain specially favourable combinations of scion and stock varieties in respect of root formation also existed, such as Trincadeira scion with stock 101–14 and Vital scion with stock 3309. Other combinations were noted as being specially unfavourable, and proved to be due to defective union between the two graft components.

1449. Blaha, J. and Štefka, F.
Vlastnosti plodů (uvologický rozbor)—indikátor praktické použitelnosti odrůd révy vinné. [**Grape quality (uvological analysis) as a guide to practical use of vine varieties**].
Sborn. Čsl. Akad. Zeměd. 1951 : **24** : 268–76.

A biometrical method of bunch analysis affording better economical evaluation of varieties has been developed. Analytical data for the most important Czechoslovakian varieties, comprising ten dessert grapes and a dozen varieties used for wine making, are presented.

1450. Žurin, A. B.
(Several viticulturists were awarded prizes for breeding new varieties of vines).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 11 : 63–64. [Russian].

Two varieties recently developed in the Crimea and two in central Asia are described.
Magarač 217 from Bastardo x Saperavi produces black oval grapes. They grow in lax conical bunches 12 cm. long and 6 cm. wide. The red dessert wine made from the grapes resembles in quality the wine made from Bastardo grapes. Magarač 9 from Bastardo x Muscat de Hambourg produces grapes suitable for making good quality wine of the Madeira type.

Muscat VIRa* [VIR Muscat] was bred from White Muscat x Muscat de Hambourg at the central Asiatic branch station of the USSR Institute of Plant Industry. It is more productive than White Muscat and Pink Muscat and shows promise as a wine making variety. VIR–1 is a seedling selection from Petite Bouchée; its grapes make good quality red dessert wine which has a faint chocolate flavour.

1451. Turković, Z.
Kroatische Sortenfragen. **(Problems relating to varieties in Croatia).**
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1951 : **1** : 147–51.

The need for building up a collection of vine varieties suitable for the different vine growing districts in Croatia is discussed. Lists are given of the old varieties and of the newer varieties, grown since the first world war, and still widely cultivated. The characteristics of some of these varieties are described and desirable qualities indicated.

1452. Kravčenko, S. M.
(The wild vine of Sahalin).
Bot. Ž. (Bot. J.), Moskva 1951 : **36** : 302–04. [Russian].

The Sahalin vine, *Vitis Kaempferi*, is regarded as suitable material for breeding varieties adapted to some districts of the Sahalin province.

1453. Wellington, R.
French hybrid grapes.
Amer. Fruit Gr. 1951 : **71** : No. 10 : 10–11, 18.

The performance of French hybrids in the United States is discussed and short descriptive notes are given on some promising early ripening red and white varieties on trial at the New York State Agricultural Experiment Station.

1454. Nacvin, A. V. and Haĭdarkulov, G.
(Some promising varieties of vine in Uzbekistan).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 11 : 35–36. [Russian].

The dessert varieties Bobo Zakir and Ėzondori and varieties Kara Kaltak [Black Kaltak], Ak

* Vsesojuznyĭ Institut Rastenievodstva [USSR Institute of Plant Industry].

Kaltak [White Kaltak], Ispisar and Saryangušty, grown for raisin making, have been selected from local material at the Uzbek Institute of Viticulture.
The dessert varieties are superior to Ak Halili. Saryangušty is the most productive of the other groups of varieties. It reaches maturity later than Kara Kaltak, Ak Kaltak and Ispisar.

1455. Gukasjjan, A. S.
(Scientific research work in viticulture in the south of Kazahstan).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) **1951** : No. **10** : **54–55.** [Russian].

Breeding vines for hardiness at the Zaĭsanskoe and Bostandykskoe Experimental Fields is reported. Over two thousand intervarietal and interspecific hybrids are being tested. Some promising hardy wild vines have been found in the Kara Tau mountains.

1456. Baranovskiĭ, A. L.
(Special agricultural methods for vines in the northwestern provinces of the Ukrainian SSR).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) **1951** : No. **4** : **25–30.** [Russian].

Notes on suitable varieties and Mičurinite breeding are included. The qualities required in the new vines are early maturity, capacity to produce sweet grapes, and delayed but vigorous growth in spring. Importance is attached to hybridization between local material and *Vitis amurensis*, and between the local and early northern vines, with subsequent training for hardiness under local conditions. The local vines mostly comprise hardy varieties of *V. Labrusca.*
Breeding work with *V. vinifera*, *V. Labrusca*, *V. amurensis* and *V. riparia* is in progress at the Žitomir Agricultural Institute. Seedlings of Portugaljskiĭ Siniĭ [Blue Portuguese], Šasla Zolotistyĭ [Golden Chasselas], Kokur Krasnyĭ [Red Kokur] and Ljnjjan Belyĭ [White Ljnjjan] are being trained for hardiness, and resistance to mildew, humid conditions, acid soil and inadequate sunshine.

1457. K., T.
(An excursional session of the Scientific Council of the Magarač institute in Moscow).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) **1951** : No. **7** : **53–55.** [Russian].

Reference was made to breeding new early and hardy vines in the Moscow province, and to progress made in developing new strains of yeasts, of which Rkaciteli 6 used for champagne making shows particular promise.

1458. Stoner, W. N., Stover, L. H. and Parris, G. K.
Field and laboratory investigations indicate grape degeneration in Florida is due to Pierce's disease virus infection.
Plant Dis. Reporter **1951** : **35** : **341–44.** (Mimeographed).

Grape varieties grown in Florida have been grouped into six classes according to longevity; longevity is dependent upon the incidence of degeneration probably caused by Pierce's disease.

FORESTRY

1459. Seitz, F. W.
Chromosomenzahlenverhältnisse bei Holzpflanzen. **(Chromosome number relationships in woody plants).**
Z. Forstgen. Forstpflanzenz. **1951** : **1** : No. **1** : **22–32.**

Research on the production of polyploids in forest trees is in progress at the Institute for Forest Genetics at Schmalenbeck in Germany. An examination of the chromosome numbers of the woody species shows that the most frequent number, as in herbaceous species, is $n = 12$, and that species with numbers higher than 12 are more frequent than those with lower numbers, especially among the angiospermous species. Figures are given showing that the pollen size is significantly greater in polyploid forms of *Populus*, *Betula* and *Aesculus* than in diploids.
The article ends with a tabulation of the chromosome numbers in the main species of woody plants, arranged according to genera, with indications of the basic numbers for the respective genera.

1460. Aus der Arbeitsgemeinschaft für Forstgenetik und Forstpflanzenzüchtung. **(From the Cooperative for Forest Genetics and Forest Tree Breeding).**
Z. Forstgen. Forstpflanzenz. **1952** : **1** : **57–60.**

On 7 and 8 March 1950 at a meeting at the new Institute for Forest Genetics at Schmalenbeck in Germany the above cooperative was founded. Its object was to provide a common meeting ground for the many workers now active in Germany in the field of forest genetics and

breeding. Its second meeting was held on 19 and 20 September 1951, abstracts of the papers presented being here published. They are as follows:—

Grehn, J. Über die Erhaltung der Keimfähigkeit bei Pappelsamen. (*Retaining germinating capacity in poplar seeds*). (*p. 58*).

Seeds kept for 1·5 years in a vacuum over calcium chloride gave 66% of viable seedlings. The method is to be used for testing the genetical effects of aging.

Illies, Z. M. Auslese und künstliche Herstellung Polyploider bei Larix *und* Picea. (*Selection and artificial induction of polyploids in* Larix *and* Picea). (*p. 58*).

In addition to the results presented in the paper referred to in Abst. 1475 some triploid individuals were also found among the treated spruce seedlings.

Kiellander, C. L. Mitteleuropäische Fichten auf schwedischen Versuchsflächen. (*Central European spruces in Swedish experimental plots*). (*p. 58*).

Comparisons in Sweden of the progenies of two spruces introduced from Central Europe with those from local spruces showed the former to be 21–57% superior in height and diameter. The German spruces sprouted later and were less damaged by late frosts. The growth differences persisted at least until the tenth year.

Krahl-Urban. Erbeigenschaften und Auswahl von Plusbäumen bei Eiche und Buche. (*Genetical properties and selection of plus trees in oak and beech*). (*p. 58*).

Extensive provenance tests are being made with *Quercus pedunculata, Q. sessiliflora* and *Fagus sylvatica*; progeny tests are being made with specially selected "plus" trees.

Langner, W. Kreuzungsversuche mit verschiedenen Fichtenarten. (*Crossing experiments with different spruce species*). (*pp. 58–59*).

Artificial hybrids of *Picea sitchensis* with *P. alba* closely resembled some trees previously suspected to be hybrids between these two species. The hybrids displayed heterosis in respect of growth rate, and were more frost resistant than the Sitka spruce.
Hybrids of *P. sitchensis* x *P. Omorica* have also been obtained.

Langner, W. Züchtung auf Resistenz gegen Lophodermium pinastri *bei* Pinus silvestris. (*Breeding for resistance to* L. pinastri *in* P. silvestris). (*p. 59*).

Seedlings have been taken from healthy trees and will be tested by artificial infestation, after which the resistant trees will be used for breeding.

Müller, R. Untersuchungen zur Unterscheidung von Pappelklonen. (*Investigations on distinguishing between poplar clones*). (*p. 59*).

One-year cuttings could be clearly separated into their respective clones on a morphological basis.

Rohmeder, E. Untersuchungen über die Verteilung der Geschlechter bei den Blüten von Fraxinus excelsior. (*Investigations on sex distribution in flowers of* F. excelsior). (*p. 59*).

The majority of trees examined bore hermaphrodite flowers, some only male and very few only female.

Rubner, K. Die oberbayerische Schwarzerlenrasse. (*The Upper-Bavarian races of black alder*). (*p. 59*).

Seedlings from selected trees from Upper Bavaria have proved much superior in growth rate and form.

Schlenker, G. Züchtungen in der Sektion Leuce *der Gattung* Populus. (*Crosses in the section* Leuce *of the genus* Populus). (*p. 59*).

Heterosis was observed in hybrids of *P. alba* x *P. tremula* but they were less satisfactory than the pure species in growth form and disease resistance. Various other hybrids have been made using *P. alba* var. *Bolleana*.

Schmidt, H. Die Erhaltung der autochthonen Hochlagenfichten im Wege der Pfropfplantagen. (*Maintaining the autochthonous highland spruces by grafting*). (*pp. 59–60*).

Special steps are being taken to preserve some of the valuable spruce material of the Bavarian alps for use as mother trees.

Stern, K. Zur Resistenzzüchtung der Douglasie gegen Adelopus. (*Breeding the Douglas fir for resistance to* Adelopus). (*p. 60*).

Both resistant and tolerant trees are being selected in the hope ultimately to combine the two properties by hybridization.

1461. Białobok, S. and Bugała, W.
Przegląd prac hodowlanych nad topolami i wyniki dotychczasowych obserwacyj przeprowadzonych nad niektórymi mieszańcami topoli w Kórniku. (**Review of studies concerning the breeding of poplars and the results of the present observations at Kórnik on some poplar hybrids**).
Roczn. Sekc. Dendr. Polsk. Tow. Bot. 1951 : **7** : 130–58.

Poplar hybrids bred by Schreiner and Stout (cf. *Plant Breeding Abstracts*, Vol. V, Abst. 803) and introduced into Poland are described with reference to: growth rate, morphological characters, adaptation to climatic conditions in Poland, and resistance to *Melampsora* sp.
The observation by Smith and Nichols (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 1202) that interspecific hybrids of poplar with *Populus Maximoviczii* as the female parent show rapid growth, regular crown shape and resistance to *Melampsora* sp. was confirmed. Pyramidal form is a very pronounced feature in F_1.
The hybrids 194, 275, 277 and 282 are resistant to frost as well as to *Melampsora* sp.

1462. Bugała, W.
Określanie płci u topoli na podstawie zabarwienia liści. (**Determination of sex in poplars on the basis of leaf colour**).
Roczn. Sekc. Dendr. Polsk. Tow. Bot. 1951 : **7** : 195–97.

In reviewing relevant findings, suggestions are put forward from which a method of identifying ♂ and ♀ poplars by the colour of vegetative organs could be worked out.

1463. Žurbin, A. I.
(**Improving the compatibility between different species of poplar by vegetative rapprochement**).
Priroda (Nature) 1951 : No. 4 : p. 66. [Russian].

Populus alba and *P. tremula* crossed more readily with each other after the male parent *P. tremula* had been trained upon *P. alba* mentor stocks.

1464. Morris, H. A.
Hybridizing forest trees to order.
Sth. Lumberm. 1948 : **177** : 240–42.

A programme of hybridization being carried out in Canada to produce fast growing poplars for pulpwood is outlined. Many crosses have been effected between the winter hardy *Populus grandidentata* or *P. tremuloides* and the fast growing *P. alba*. Additional winter hardiness was incorporated by crossing with *P. tremula* from Europe and *P. adenopoda* from the highlands of China. Hybrids are undergoing adaptability trials in different parts of Canada. Wood quality has proved satisfactory, but strains with longer fibres are being sought.

1465. Behrndt, G.
Zur Birkenzüchtung. (**Birch breeding**).
Z. Forstgen. Forstpflanzenz. 1952 : **1** : 33–35.

This account of birch breeding at the former Kaiser Wilhelm Institut für Züchtungsforschung in Müncheberg, written from memory as the records were destroyed in the war, describes the so-called "flying birches" of Prussia, with wood of particularly high quality for aircraft manufacture. Attempts to cross the species *Betula verrucosa* with *B. pubescens* mostly failed and an examination of the progenies of birches collected in a large number of different localities in Europe showed no natural hybrids at all, and it seems improbable that the flying birches are interspecific hybrids. They resemble the Swedish grey birches and are ascribed unequivocally to *B. verrucosa*. The trees all proved self sterile and attempts to produce seed by crossing two individuals of the grey birch type were interrupted during the war. The type is not limited to Prussia however and useful breeding material may be obtainable in other parts of Germany. The possibilities of improving birch by breeding are illustrated by the fact that a difference of 44% was observed in the height of seedlings from good and bad trees.

1466. Jensen, W.
Björk ur teknisk och kemisk synpunkt. (**Birch from technical and chemical points of view**).
Svensk PappTidn. 1951 : **54** : 739–45.

Introducing this study on the morphology and chemistry of the outer and inner bark and of the wood of the birch, the author briefly considers variation in *Betula verrucosa* ($2n = 28$) and *B. pubescens* ($2n = 56$) with special reference to the type of timber and of bark. Differences in leaf shape are illustrated.

1467. Jentys-Szaferowa, J.
Analysis of the collective species *Betula alba* L. on the basis of leaf measurements. Part II: *Betula pubescens* Ehrh., *B. tortuosa* Ledeb., *B. carpatica* Waldst. et Kit.
Bull. Int. Acad. Cracovie 1950 : Sér. B. : No. 1–3 : 1–63.

Biometric analysis of the species at present grouped as *B. alba* has been continued (*cf.*

Plant Breeding Abstracts, Vol. XXI, Abst. 1380) with the following: *B. pubescens*, *B. tortuosa* and *B. carpatica*. In comparison with *B. verrucosa*, *B. pubescens* differs in the interrelationship of the 16 leaf characters studied. *B. pubescens* possesses only slight variability in the position of the widest part of the leaf blade, but shows marked local variability in leaf size; no distinct correlations were observed between the shape of the lower half of the leaf blade and other characters, in contrast with correlations previously observed in *B. verrucosa*. All leaf samples of *B. tortuosa* collected between the Arctic Circle and the Arctic Ocean in Scandinavian countries showed a similar mean shape and similar variability. In characters such as number of lateral veins, position of the widest part of the leaf blade and angle of attachment of the second vein, *B. tortuosa* ($2n = 56$) deviates from *B. pubescens* ($2n = 56$) towards *B. nana* ($2n = 28$); it is, however, unlikely that *B. tortuosa* arose as a hybrid between two species belonging to different sections of the genus. *B. carpatica* has leaves similar in shape to those of *B. tortuosa*, but shows greater variability in the position of the widest part of the blade, thus resembling *B. verrucosa*; in isolated mountainous areas *B. carpatica* shows marked local variability in respect of this character.

1468. Kobendza, R.
Wartościowy mieszaniec lipy węgierskiej i szerokolistnej *Tilia varsaviensis* (*T. argentea* x *T. platyphyllos*). (**_T. varsaviensis_, a valuable hybrid between _T. argentea_ and _T. platyphyllos_**).
Roczn. Sekc. Dendr. Polsk. Tow. Bot. 1951 : **7** : 159–74.

The new hybrid, which arose in Warsaw by natural pollination of *T. argentea* by *T. platyphyllos*, is described. The fruits vary in shape and germinate rarely.

1469. Ivaščenko, A. I.
(**Hardy forms of *Eucalyptus*).**
Agrobiologija (Agrobiology) 1951 : No. **3** : 47–51. [Russian].

Several hardy seedlings, some or all of which may be interspecific hybrids, have been obtained as a result of natural selection and training under severe winter conditions at the Lenkoran Branch of the Azerbaïdžan Scientific Research Institute of Permanent Plantation. The initial material cultivated in the plantation comprised 11 species of *Eucalyptus*. It is hoped that the next seed generation will give new exceptionally hardy forms.

1470. Langner, W.
Kreuzungsversuche mit *Larix europaea* D.C. und *Larix leptolepis* Gord. (**Crossing experiments with *L. europaea* D.C. and *L. leptolepis* Gord.).**
Z. Forstgen. Forstpflanzenz. 1952 : **1** : 2–18, 40–56.

Crosses in all possible combinations were made between 5 trees of *L. leptolepis* and 2 of *L. europaea*. The two species crossed successfully in both directions; both were highly self sterile, the degree of self sterility varying somewhat in different trees. Heterosis was observed in the majority, though not all, of the interspecific crosses; the heterosis was more marked in respect of girth than of height.
The species and hybrids varied in sensitivity to environmental influences, *L. leptolepis* being the most sensitive and the hybrid *L. lepteuropaea* the least.
The hybrids tended to be more slender than the pure species. On the whole they were intermediate between the parental species in growth habit, though variation occurred between the individual progenies; the trunks of the hybrids tended to be straighter than those of the parent species; their colour and cone form were intermediate. Transgression was observed in cone size, with a predominance of forms larger than the parents, though forms smaller than either parent also occurred. The number of cones varied from one hybrid to another, and some of them at least were fertile; no significant difference in vigour of growth was observed between trees bearing many or few cones, though trees bearing cones tended to have thicker and straighter trunks than those without. The hybrids tended to flower somewhat before the parent species, some before the leaf buds opened, some after.
The hybrids were less damaged by transplantation than either of the parent species.
The few seeds obtained by self pollination gave rise to plants of very low vigour, many of which died in the first two or three years. The selfed seedlings varied considerably but the diameter of their trunks was invariably less than the normal; the selfed progenies of certain trees of *L. europaea* showed an unusually high proportion of misshapen individuals. Also the progeny of certain parental combinations proved consistently inferior whereas certain other combinations regularly gave good progenies; certain parental combinations showed marked differ-

ences between reciprocal crosses, though the majority showed little or no difference.
The interspecific hybrids displayed marked resemblances to a certain type of tree found fairly commonly in larch woods in parts of Germany, where natural hybrids are thought therefore to be more widespread than has been supposed, particularly in Japanese larch woods, the hybrids being more vigorous than the pure species.
The frequency distribution of the size classes in the progenies of crossed and open-pollinated trees indicates that size is conditioned by polymeric genes. Differences in the frequency distribution of the progeny of open-pollinated trees suggest that any one tree is pollinated by pollen from a very limited number of individuals and not by a homogeneous pollen mixture. The hybrids were larger than the parents more often than would be expected on a pure probability basis owing evidently to a heterosis effect. This is thought to be due to the combination of growth genes operative in the heterozygous state. The superiority of the hybrid trees was maintained at least up to the thirteenth growth year, with every indication that it would continue. The actual superiority of the hybrids varied according to the environment, being most pronounced in those environments most favourable to the two parental species.
Experiments are now being made to test the possibility of hastening flowering and fruit production by grafting on dwarf spruce, with the object of producing heterotic hybrids on a large scale for afforestation. Practical directions are given for the production of hybrid seed and for the choice of the best parental combinations.

1471. Dorman, K. W.
Breeding better southern pines for the future.
Sth. Lumberm. 1947 : **175** : 147–50.
A popular account is given of the techniques of crossing pine species in the USA, with particular reference to work at Lake City, Fla., where hybrids between slash pine (*Pinus caribaea*), loblolly pine (*P. Taeda*) and longleaf pine (*P. palustris*) have been produced; it is hoped that resin yields from mature hybrids will be greater than from their respective parents.

1472. Wettstein, W.
Über Bastarde *Pinus nigra* var. *austriaca* x *silvestris*. (**Hybrids of *P. nigra* var. *austriaca* x *P. silvestris***).
Z. Pflanzenz. 1951 : **30** : 473–77.
The progenies of two trees thought to be hybrids between *P. nigra* and *P. sylvestris* were investigated, comparing them with progenies from trees of the respective pure species. Figures for terpene oil content of the resin, needle length, 1000 seed weight, and production of dry matter show the hybrids to be intermediate; the cotyledon number in the hybrid seedlings covered the entire range of variation of the two species. The hybrid seedlings segregated into almost equal numbers of plants resembling one or other of the two species; no heterosis was observed. From a practical point of view more interest attaches to the so-called miracle trees which occur, apparently as mutations, in *P. nigra* var. *austriaca* and yield 3–4 times as much resin as the average tree. The difference can be clearly seen in cross sections taken on three-year-old trees; the area of the resin canals is three times as great in seedlings of a miracle tree as in normal seedlings.

1473. Zinnai [Jinnai], I. and Chiba, S.
(Naturally occurring tetraploids of *Cryptomeria japonica*).
Ikushugaku Zasshi / Jap. J. Breeding **1951** : **1** : 43–46. [Japanese].
Spontaneous tetraploid seedlings of *C. japonica* are described. They are characterized by thicker and more twisted needles than the diploids.

1474. Stiff, M. L.
A naturally-occurring triploid juniper.
Va. J. Sci. **1951** : **2** : p. 317. (Abst.).
A triploid juniper ($2n = 33$) was found at Blandy Experimental Farm, Va.

1475. Illies, Z. M.
Colchicinversuche an *Larix decidua* Miller und *Picea Abies* (L.) Karst. [**Colchicine experiments with *L. decidua* Miller and *P. Abies* (L.) Karst**].
Z. Forstgen. Forstpflanzenz. **1952** : **1** : 36–39.
Seed of *L. decidua*, *L. leptolepis* and *P. Abies* was treated with colchicine solutions of various concentrations. Two plants of *L. decidua* with tetraploid tissue in both the root and stem were produced, and some with tetraploid roots but diploid shoot tissue. In *P. Abies* three tetraploid individuals were obtained. One of them at least proved to be mixoploid, and other plants in both species which on morphological grounds would have been classed as polyploid proved on examination to be diploid. Since the cytological examinations were made only in the second

year of growth it seems that there is a tendency for the chromosome number to revert to normal more quickly than the morphological features.

1476. Rohmeder, E.
Die Nachkommen einer 14 jährigen und einer 170 jährigen Fichte. (**The progenies of a 14 year and a 170 year old spruce**).
Z. Forstgen. Forstpflanzenz. 1951 : **1** : No. 1 : 19–21.

Three cones were taken in 1942 from a 14 year old spruce and their seeds sown together with those from a tall vigorous tree known to be 170 years old. The seedlings of the young spruce surpassed those of the old spruce in vigour of growth by 41% at the age of three years; in the fifth year the difference was only 7% and in the seventh year the seedlings of the old spruce exceeded the others by 6%. The seedlings of the young tree suffered somewhat less from the extreme drought of 1947 and 1949, 73% of the plants having died as compared with 94% of the old spruce seedlings.

1477. Instituto Forestal de Investigaciones y Experiencias. Resumen de los trabajos más importantes que se vienen realizando en la Estación Regional de Lourizán (Pontevedra). [**Institute of Sylvicultural Research and Testing. Summary of the most important work in progress at the Regional Station at Lourizán (Pontevedra)**].
Bol. Inform. Minist. Agric. Madrid 1951 : **4** : No. 28 : 50–51.

Seed of *Pinus Pinaster* from different localities in Spain is being sown in Galicia for study on the lines established for the international provenance tests of *P. sylvestris*. Examination of the resin production has led to the selection of some outstanding trees, the best of which was an individual with a diameter of 0·43 m. which gave an average yield of 30 and 35 kg. of resin in 1949 and 1950 respectively.
Comparisons are being made between local and Australian material of *P. insignis*.

1478. Grano, C. X.
What loblollies are likely cone producers.
J. For. 1951 : **49** : p. 734.

Data accumulated in southern Arkansas concerning the crown density, crown area, tree age and size and average number of cones of *Pinus Taeda* show that the past cone production record is the only reliable indicator for selecting desirable seed trees.

VEGETABLES

1479. **First Annual Report of the National Vegetable Research Station, Wellesbourne, Warwick 1949-50** (1951) : Pp. 59.

Boyes, D. Plant breeding report. (*pp. 11–13*).

Onion. The performance of three selections undergoing trials is described. Two varieties, Cambridge 2 and 10, are being released.

Cabbage. Cambridge Red, a new variety with solid heads suitable for pickling, has been developed by selection from stocks originally imported from the Netherlands.
Several selections have been made from Christmas Drumhead in order to obtain smaller strains with increased winter hardiness. A smaller form, named Cambridge Drumhead, is to be released shortly. Another selection slightly larger than Cambridge Drumhead but with improved hardiness is undergoing further trials; it has been designated Cambridge Late Drumhead.
Selections from January King have been made for increased uniformity in size, date of maturity and growth habit. Cambridge February has shown promise as a hardy late-maturing selection with smaller heads than January King; the red coloration typical of the latter variety is absent in this selection.

Broccoli. A winter hardy variety, Cambridge Hardy Late, which originated from seed obtained in Derbyshire, has been undergoing final trials before release. Two dwarf varieties to be distributed shortly, X 10 and X 13, are recommended for market gardens. Mass selections have been made with Roscoff; one selection designated RL, has proved suitable for south-western areas.

Brussels sprouts. Cambridge Special has been developed for canning purposes; it is well suited to fenland soils.
Crosses between selected individuals of different varieties have produced progeny superior to either parent in certain respects. The quality of hybrid seed obtained from small scale mixed plots indicates that successful hybridization may be possible on a field scale.

Spencer, D. M. Watercress investigations. (*pp. 52–56*).

During a survey of watercress beds in Hampshire it was noted that the less vigorous brown-leaved strain was more susceptible to crook root, caused by members of the Plasmodiophorales, than the green-leaved strain.

1480. Vrijhof, B., Knoppien, P. and Stadhouders, P. J.
De Tuinbouw in West-Duitsland. (**Horticulture in Western Germany**).
Meded. Direct. Tuinbouw **1951** : **14** : 805–44.

This is a report on a tour in August, 1951, to study research and educational organization relating to horticulture in Germany. One section is devoted to races, stocks and the breeding of pome and stone fruits, with a brief note on hazel nuts and walnuts.
At Ladenberg the inheritance of bolting, early heading and resistance to *Bremia Lactucae* in lettuce is being studied.
The early American melon Far North, with its good flavour, has been crossed with the German variety Pilnitzer.
In work on tomatoes, the eelworm and *Alternaria* resistant species *Lycopersicon peruvianum* is being used in crossing.

1481. Giorgadze, N. P.
(**Vegetable growing on collective farms of the Georgian SSR**).
Sad i Ogorod (Fruit and Vegetable Gardens) **1951** : No. 11 : 40–42. [Russian].

Four new varieties of onion and one variety each of pepper, beetroot, melon, water melon, cucumber, eggplant and *Phaseolus* bean have been recently developed in Georgia.

1482. Hertog, L. T. B.
De veredeling van polyploidie bij tuinbouwgewassen. (**Improving horticultural crops by polyploidy**).
Studiekring voor Plantenveredeling 28 February, 1951 : Wageningen 403–05. (Mimeographed).

Although 50% of the higher plants so far examined are polyploids, many important crops are not, e.g. rye, barley, clover and beet. The proportion of polyploids in angiosperm crop plants was found to be about 40%. Conifers are 100% diploid. Green vegetables show no correlation between diploidy and annual habit; but polyploid herbs are generally biennial or perennial.

1483. Lamm, R.
Sortförsök med köksväxter. (**Variety trials with vegetables**).
Försök och Forskning **1951** : **8** : 67–68.

Lamm, R., Tometorp, G. and Åvall, H.
Klassificerande sort- och stamförsök med köksväxter 1947–1950. (**Classifying variety trials with vegetables in 1947-1950**).
Medd. Stat. Trädgårdsförsök **1951** : No. 65 : Pp. 63.

Detailed results of the Swedish classifying trials of varieties and strains of beans, peas, cucumbers, cauliflowers, tomatoes, onions, leaks, garden beets and *Scorzonera* are recorded (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1348 and Vol. XXI, Abst. 681).

1484. Hoffman, J. C.
Adaptability of vegetable varieties to the Everglades and adjacent areas.
Circ. Univ. Fla. Agric. Exp. Sta. **1949** : S–7 : Pp. 15.

The results of variety trials on the following are summarized: green and wax snap bean, Lima bush bean, cabbage, celery, cucumber, endive, lettuce, potato, squash and sweet corn.

1485. Tatuno [Tatsuno], S.
(**On artificial polyploids of the radish. I.**).
Idengaku Zasshi / Jap. J. Genet. **1947** : **22** : 31–32. [Japanese].

Autotetraploid strains of *Raphanus sativus* were obtained from 7 Japanese varieties after colchicine treatment. These were then intercrossed in numerous combinations to produce a series of allotetraploids. Meiosis in the autotetraploids was highly regular and fertility good; in the allotetraploids, tetravalents, which were occasionally noted in the autotetraploids, were observed only once.

1486. Tatebe, T.
(**On the behaviour of incompatible pollen on the style of the Japanese wild radish**).
Idengaku Zasshi / Jap. J. Genet. **1947** : **22** : p. 97. [Japanese].

Inhibition of pollen germination and development, after the application of self and cross incompatible pollen, has been observed in the Japanese wild radish; the phenomena noted were similar to those reported after incompatible pollination of the cultivated radish.

1487. Karolinskaja, H. M.
(The importance of amitosis in the process of cell division).
Agrobiologija (Agrobiology) 1951 : No. 3 : 98–103. [Russian].

Cytological investigations in Leningrad showed that amitosis and nuclear fragmentation occurred in some tissues of the onion, garlic and tulip.

1488. Davydovič, S. S.
(Breeding the Jerusalem artichoke).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 2 : 40–46. [Russian].

Breeding work with *Helianthus tuberosus* at the North Osetian State Breeding Station is described. The Ukrainian variety, Kievskiĭ Belyĭ [White Kiev] and Belyĭ Ulučšennyĭ [Improved White], which originated from France, proved more productive than the North Caucasian land varieties. The forms producing white tubers normally yielded more tubers than the red-tubered forms and their tubers contained more sugar. Several productive varieties, including two intervarietal hybrids, Belyi Urožaĭnyĭ [White Productive] and Vadim, have been developed.

1489. Perry, B. A. and Jones, H. A.
South gazes into a new crystal.
Sth. Seedsman 1951 : **14** : No. 10 : 22, 55.

Texas Agricultural Experiment Station, in co-operation with the US Department of Agriculture, has developed a new white onion, L 690, from a series of crosses and selections involving Crystal Wax, Yellow Bermuda and White Persian. L 690 matures earlier than Excel (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1791) in southern Texas and is particularly suitable for transporting to northern states; it is crisp and mild in flavour and thus desirable for salads.
Tabulated data concerning the performance of L 690 in Texas over three years indicate a tendency to split and form two bulbs. Selections are being made to overcome this tendency.

1490. Plinka, A. D.
(A method of artificially crossing bulb onions).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 72–74. [Russian].

A technique for achieving cross pollination by enclosing maternal and pollinating inflorescences in parchment bags is described with reference to five intervarietal crosses.

1491. Nishi, S.
(A new method of breeding F_1 hybrids).
Ikushugaku Zasshi / Jap. J. Breeding 1951 : **1** : p. 71. [Japanese].

American work on the production of heterotic F_1 onion hybrids using cytoplasmically determined male sterility is described (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1251).

1492. Ownbey, M.
The genus *Allium* in Texas.
Res. Stud. St. Coll. Wash. 1950 : **18** : 181–222.

Texas contains the only important centre of diversity and probably the centre of dispersal of the genus *Allium* in North America east of the continental divide. The genus in Texas is classified into 12 species, one of which, *A. canadense*, includes five varieties, and another, *A. perdulce*, two. The distributional relationships of the species and varieties are discussed.

1493. Vorster, P. W.
Cultural experiments with onions in the Transvaal.
Fmg S. Afr. 1950 : **25** : 313–15, 328; 353–56; 1951 : **26** : 20–22; 45–48, 51; also Bull. Dep. Agric. S. Afr. 1951 : No. **316** : Pp. 25.

Sections are included on the suitability of varieties for South Africa in relation to day length and on the performance and seed production of Texas Grano. The early, short day variety Texas Grano appears to be very promising, especially in the Transvaal (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 590). The Pretoria area is well suited to selection for the elimination of early bolters. Progress has been made in further selection of Texas Grano for an even earlier type.

1494. Carlsson, G.
Hammenhögs gräslök Special OJO för drivning. **(The Hammenhög forcing chive Special OJO).**
Medd. Gullåkers VäxtförädlAnst., Hammenhög 1951 : Nos 7–8 : 187–90.

The above new strain which has been obtained by clonal selection at the Gullåker Plant Breeding Institute, Sweden, is particularly suitable for forcing.

1495. Sneep, J.
De betekenis van de andromonoecische planten voor de veredeling van *Asparagus officinalis* L. (**The importance of andromonecious plants for breeding *A. officinalis* L.**).
Meded. Direct. Tuinbouw 1951 : **14** : 758–66.
Confirmation of Mendelian sex determination in asparagus was experimentally obtained by the writer and it is shown that homozygous male (*MM*) plants can be identified by test crosses with any female plant, and the F_1 progeny from such a cross are all male (*Mm*) plants.
It seems possible that andromonecism may be hereditary and that it might be ultimately possible to obtain *MM* plants which on selfing produce *MM* offspring only. Hereditary andromonecism allows of inbreeding to obtain constant and homogeneous lines which, in turn, could be used to take advantage of any heterosis effect there might be on crossing them (cf. *Plant Breeding Abstracts,* Vol. XX, Abst. 1203).

1496. Hanna, G. C. and Baker, G. A.
Analysis of asparagus field trials on the basis of partial records.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 273–76.
The relative efficiency of three methods of selecting partial data during field trials is compared with that of complete records. Although comparatively reliable results were obtained by taking data every other week, abandonment of complete records is not recommended.

1497. Chang, L. and Li, C.
(**The Hsiehtawanshu cabbage**).
Fukien Agric. J. 1949 : **11** : 105–07. [Chinese].
The variety Hsiehtawanshu [University Late] is a late maturing selection of Sutton's Drumhead adapted to the conditions of Fukien. It was produced at Fukien Christian University.

1498. Flory, W. S. (Jun.).
Effect of environment on some genetic characters in horticultural crops.
Va. J. Sci. 1951 : **2** : 300–01. (Abst.).
Analyses of average length/width head measurements of 28 lines of All Head Select cabbage grown in five States indicate a trend from flat, through round, to elongated heads with a change from northern to southern latitudes. Environmental and genetical factors influencing the results are discussed.

1499. Eddins, A. H. and Tisdale, W. B.
Cabbage black rot and yellows and their control.
Circ. Univ. Fla. Agric. Exp. Sta. 1949 : No. S-4 : Pp. 12.
The following cabbage varieties have shown a high degree of resistance to yellows (*Fusarium oxysporum* f. *conglutinans*): early, Resistant Detroit and Resistant Premier; mid-season, Marion Market; and late, Wisconsin Ballhead.

1500. Haine, K. E.
Vegetative propagation from the broccoli curd after suppression of flowering.
Nature, Lond. 1951 : **168** : 919–20.
Large numbers of plants can be obtained from a single curd by rooting the leafy shoots which develop after suppression of flowering at high temperature. The method should prove useful in breeding.

1501. Crnko, J.
Estudios comparativos sobre la lechuga.
(**Comparative studies with lettuce**).
Inform. Invest. Agríc. (IDIA), B. Aires 1951 : **4** : Nos 42–43 : 22–31.
Trials were made with 19 lettuce varieties, local and introduced, each of which is described. The best varieties for Argentine conditions were Imperial 456, Great Lakes and certain others of the Imperial group.

1502. Bohn, G. W. and Whitaker, T. W.
Recently introduced varieties of head lettuce and methods used in their development.
Circ. US Dep. Agric. 1951 : No. 881 : Pp. 27.
Breeding and selection methods used by the US Department of Agriculture to develop the Great Lakes lettuce and a series of Imperial varieties are outlined.

1503. Ono, H.
(**The F_2 generation of *Paraixeris denticulata* x *Lactuca squarrosa***).
Idengaku Zasshi / Jap. J. Genet. 1947 : **22** : p. 26. [Japanese].
Chromosome numbers ranging from $2n = 12$ to $2n = 16$ were counted. Two to three multivalents were observed in metaphase plates.

1504. Hawthorn, L. R. and Pollard, L. H.
Selection of Great Lakes lettuce strains for higher seed yields.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 323–28.
Data are presented concerning wide variation in seed production among 25 inbred lines, already

selected for marketable qualities, grown in a balanced lattice with six replications at the Utah Agricultural Experiment Station. The highest yielding strain produced over four times as much seed as the lowest yielding strain. Selection for types with high seed yields is in progress.

1505. Barnes, W. C.
Mosaic resistant Parris Island. New cos lettuce may restore "lost industry" in 1952.
Sth. Seedsman 1951 : **14** : No. 12 : 24, 80.
A good quality, dark green lettuce, named Parris Island, has been developed at Beltsville, Md., by selection from crosses made between a mosaic resistant introduction from Europe and commercially acceptable American varieties. It possesses a high degree of resistance to mosaic.

1506. Howard, H. W. and Lyon, A. G.
Effect of light on the germination of water cress seeds.
Nature, Lond. 1951 : **168** : 253–54.
Seeds of *Nasturtium officinale* germinated in both light and dark, those of *N. microphyllum* only in the light. Tetraploid *N. officinale* behaved in a similar manner to the diploid form. Data on germination in *N. microphyllum* x *N. officinale*, autotetraploid *N. officinale* x *N. microphyllum* and the amphidiploid *N. microphyllum* x *N. officinale* suggested that the effect of light on germination is through the embryo and not the testa, and that inability to germinate in the dark is dominant to ability.

1507. van Haltern, F.
"Georgia 47", Mildew O.
Sth. Seedsman 1951 : **14** : No. 11 : 31, 45.
Georgia 47, a medium-sized cantaloupe originating at the Georgia Experiment Station from (Hearts of Gold x PI 29554) x Smith Perfect is very resistant to both downy and powdery mildews; it also possesses some resistance to plant lice. Consequently there is no need to plant early to avoid mildew epidemics, as vines of Georgia 47 remain uninfected and vigorous until late September. The fruits, which have salmon-coloured flesh and thin but tough rinds, compare well with other commercially desirable melons. Although Georgia 47 is at present susceptible to *Macrosporium* leaf blight, crosses have been effected with resistant strains to incorporate resistance to this disease also.

1508. Yanagisawa, N. and Hosono, M.
(The development of the Shinasahi water melon).
Ikushugaku Zasshi / Jap. J. Breeding **1951 : 1** : 66–70. [Japanese].
Shinasahi [New Rising Sun] is a heterotic F_1 hybrid of Asahiyamato x Miyako 1 [Capital I]. It is distinguished by high yield, earliness, disease resistance and transportability.

1509. Isbell, C. L.
Cole's Allheart.
Sth. Seedsman 1951 : **14** : No. 10 : 20, 56.
The appearance, average yield, flesh quality and sugar content of this new water melon, developed by selection from an unnamed strain growing on the southern Appalachian Plateau, are described as outstanding; its rind and texture suggest that it will transport well.

1510. Kuznecov, P. E.
(Manchurian water melons).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 11 : 61–62. [Russian].
Brief descriptions of the Manchurian land varieties of water melon, cultivated in the Primorskiĭ territory, are given. The red fleshed varieties produce round, smooth and green fruits weighing 2 to 6 kg. and containing small seed. The yellow fleshed varieties yield larger ellipsoid fruits having more tender cream or yellow flesh and larger seed. The fruits are smooth and pale green. Their flavour is good. The Manchurian land varieties are earlier and more productive and have a higher percentage of marketable fruits than Stokes. They show a higher degree of resistance to fungous diseases, particularly to anthracnose and are regarded as suitable for cultivation in other parts of the USSR.

1511. McKeen, C. D.
Investigations of *Fusarium* wilt of muskmelons and watermelons in southwestern Ontario.
Sci. Agric. 1951 : **31** : 413–23.
Three isolates of *F. oxysporum* var. *niveum* from water melons growing in scattered localities showed sufficient pathogenic differences, in respect of the Hoodoo musk melon and Miles and Cole's Early water melons, to be considered distinct physiological strains. All 12 isolates obtained from musk melons resembled one another.

1512. Schaal, W.
New watermelon variety developed at California.
Crops and Soils 1951 : **4** : No. 2 : p. 26.
The miniature water melon Baby Klondike, developed by the California Agricultural Experiment Station from Klondike R–7 x Baby Delight, is resistant to *Fusarium* wilt and gives

high yields of small, round, green fruits with red flesh and tan seeds.

1513. Millán, R.
Biología floral en especies de "Cucurbita". (**Floral biology in species of *Cucurbita*).**
Rev. Argent. Agron. 1951 : **18** : 176–82.

Some notes, based on a study of the literature, are given on the floral structure, proportion of male and female flowers at different periods of development, degree of fertility, interspecific and within species, and the methods of making crosses.

1514. **Develop improved strain of Boston Marrow squash.**
Seed World 1951 : **69** : No. 6 : p. 47.

An improved strain of Boston Marrow, developed by the New York Experiment Station, matures earlier than the original variety and gives increased yields of uniform squashes with good processing quality.

1515. Smith, W. L.
Bacterial blight of beans and its control through hybridization and direct control measures.
Univ. Wyo. Publ. 1951 : **26** : p. 228. (Abst.).

Approximately 33% of the hybrid lines undergoing trial showed resistance to halo blight, and 1½% possessed common blight resistance.

1516. Pearson, O. H., Hopp, R. and Bohn, G. W.
Notes on species crosses in *Cucurbita.*
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 310–22.

Results of hybridization between *C. maxima* and *C. moschata* carried out independently in California, Vermont and Massachusetts are correlated. The chromosome number of both species is $2n = 40$. Although the insect resistance of *C. moschata* and fruit flavour of *C. maxima* were combined successfully in F_1 hybrids, sterility of the latter prevented further breeding and selection of desirable diploid lines. Amphidiploids ($2n = 80$) induced by treating F_1 hybrid seedlings with colchicine were, however, fertile; several insect resistant lines bearing fruit of good quality have been selected for further hybridization.

1517. Hartmair, V.
Ist die Bitterstoff freiheit der Treibgurken auf dem Wege der Polyploidiezüchtung zu erreichen? (**Is freedom from bitterness in forcing cucumbers attainable by means of breeding for polyploidy?**)
Veröff. Bundesanst. alp. Landw. Admont 1951 : No. 5 : 22–26.

The percentage of polyploids produced by the same colchicine treatment of shoot tips varied with the variety treated, the highest being 24% with Weigelts Beste von Allen [Weigelt's Best of All] and the lowest 3–7% with Becks Namenlose [Beck's Nameless] and Spot Resisting. The polyploid plants mostly proved to be tetraploids; their fruits were juicy and entirely free from bitterness; they retained their turgor even at high temperatures which caused the corresponding diploid plants to wilt. The tetraploids reduced fertility had but gave rise to a few plants by selfing. These, although they were tetraploid, showed much greater resemblance to the diploids, but when grown even under extreme drought conditions very few of them formed any bitter principle. Two octoploid plants appeared in their selfed progeny.

1518. Porter, C. A. and McWhorter, F. P.
A virus from mosaic-diseased *Echinocystis* in Oregon.
Phytopathology 1951 : **41** : 942–43. (Abst.).

An unidentified virus isolated from mottled leaves of *E. oregana* produced severe stunting with yellow lesions and systemic patches on the leaves of National Pickling cucumber. The virus failed to infect other plants normally susceptible to cucumber mosaic virus.

1519. Carlsson, G.
Försök med den nya växthustomaten Potentat II. (**Trials with the new greenhouse tomato Potentat II**).
Medd. Gullåkers VäxtförädlAnst., Hammenhög 1951 : Nos 7–8 : 147–50.

The triploids, obtained from a cross of tetraploid and diploid forms of the variety Potentat [Potentate], were back-crossed to the diploid and produced numerous aneuploids with various chromosome numbers; and, by selection from a subsequent cross between strains with $2n = 24 + 1$ and $2n = 24 - 1$, Potentat II was obtained, which has proved earlier and more productive than the parent form Potentat/41.

1520. Carlsson, G.
Försök med den nya växthustomaten Patrik/50. (**Trials with the new greenhouse tomato Patrik/50**).
Medd. GullåkersVäxtförädlAnst., Hammenhög 1951 : Nos 7–8 : 150–53.

Obtained at Gullåker Plant Breeding Station from the cross Carrick x Potentat [Potentate], Patrik/50 has proved earlier than its parents and surpassed its pollen parent in total yield and may possibly be suitable for raising in the open.

1521. Carlsson, G.
Försök med den nya busktomaten Bonita OJO/50. (**Trials with the new bush tomato Bonita OJO/50**).
Medd. GullåkersVäxtförädlAnst., Hammenhög 1951 : Nos 7–8 : 153–56.

By crossing Dansk Export [Danish Export] and Bonner Beste, Gullåker Plant Breeding Station has obtained Bonita OJO/50, which has yielded five times more in the first 14 days of harvesting than Bellevue Busk [Bellevue Bush]. In total yield it has outyielded Bellevue Busk by about 50%.

1522. Denisen, E. L.
Carotenoid content of tomato fruits as influenced by environment and variety. II. Effects of plant nutrients, gas storage, and variety.
Iowa St. Coll. J. Sci. 1951 : **25** : 565–74.

Rutgers maintained its superiority in respect of lycopene content at the Iowa Agricultural Experiment Station where 12 varieties and hybrids were analysed. Among the golden varieties, Jubilee contained more carotene, xanthophyll and prolycopene than Margold. The lycopene content of certain hybrids showed the effects of both parents; in Rutgers x Jubilee and Rutgers x *L. pimpinellifolium* (Accession 160) the parents with the lower lycopene content, Jubilee and Rutgers respectively, exerted the greater influence on the offspring.

1523. Andrus, C. F.
A character useful in the study of natural cross-pollination in tomatoes.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 345–46.

A green-stemmed seedling, T 2037, arising by a single gene mutation in a selection made after a series of intervarietal crosses, has been released by the South Carolina Vegetable Breeding Laboratory for use in breeding. The green stem character, readily distinguished by the absence of purple colour in the seedling stem, is inherited as a simple recessive. T 2037 can therefore be used as an indicator of the degree of cross pollination in mixed plots; any green-stemmed plants pollinated by purple-stemmed individuals will produce F_1 seedlings with purple stems. At Charleston, SC, an average of 1·68% cross pollination was recorded in a block of green-stemmed plants grown in the centre of a field containing purple-stemmed tomatoes.
T 2037 possesses a high degree of resistance to *Fusarium* wilt, *Cladosporium* leaf mould and *Stemphylium* leaf spot; it produces a good set of medium to large fruit.

1524. Gluščenko, I. E.
(**The results of crosses between some vegetative hybrids of tomatoes and between these hybrids and the initial components in the grafts**).
Trudy Inst. Genetiki (Proc. Inst. Genet.) 1950 : No. 18 : 23–28. [Russian].

The inheritance of colour in the vegetative hybrids Zolotaja Koroleva [Golden Queen] on Ficarazzi and Golden on Meksikanskiĭ 353 [Mexican 353] was investigated. The results have been summarized in *Plant Breeding Abstracts*, Vol. XXI, Abst. 3099.

1525. Felföldy, L. J. M.
Experiments with the first seed generation of tomato grafts.
Acta Biol. Acad. Sci. Hungar. 1951 : **2** : 3–53.

Morphological and physiological analyses were carried out on the first seed generation of grafts involving the varieties Golden Apple, Oxheart and Pruniforme. No changes were recorded in the progeny from grafts between Golden Apple and Pruniforme. Both morphological and physiological changes were however obtained in the progeny from grafts between Golden Apple as scion and Oxheart as stock and the reciprocal grafts. The numerous morphological changes observed included the appearance of several recessive characters, regarded as cases of reversion of dominance. Physiological data are interpreted as showing Golden Apple and Oxheart to be distantly related, and Pruniforme and Golden Apple closely related. The view is expressed that, in cases where the stock and scion are of the same age, changes can only be expected in the seed progeny of graft hybrids whose components differ markedly from each other in metabolism.

1526. Brežnev, D. D. and Aĭzenštat, Ja. S. **(Some questions relating to increased vitality of hybrid seed).** Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) Ser. Biol. 1951 : No. 3 : 40–51. [Russian].

Mičurinite investigations of heterosis in several tomato hybrids at the Maĭkop Research Station of the USSR Institute of Plant Industry are reported. Some experiments were also conducted at the Sestroreck Experimental Base of the Leningrad State University.

The F_1 of several intervarietal and interspecific hybrids was more vigorous when derived from the fourth and fifth inflorescences than from inflorescences formed at a later stage of the female variety. Similarly, the hybrids from all crosses yielded best when the egg cells of the female varieties were fertilized at the time of reaching physiological maturity. In most hybrids, this occurred when the flowers were pollinated on the sixth or seventh day after emasculation. The seed from pollinations made on the same day, the day after or on the ninth or tenth day after emasculation gave less productive progenies.

The study of the effects of the age of pollen suggests that three day old pollen produces more marked heterosis than pollen kept for six days or longer and that characters from the female parent may become more apparent in hybrids when physiologically-weakened, older pollen is used.

Vegetative hybridization was found to intensify heterotic effects in the tomato hybrids Ficarazzi x Earliana, Bison x Planovyĭ, Višnevidnyĭ Krasnyĭ [Red Cherry] x Bison and Bison x Mikado. This was shown by increased yields of the hybrids. In all the above crosses the female parent was grafted on the stock of the male variety and then cross-pollinated. In the case of Bison x Planovyĭ, wild tomato 1615 was also used as a stock.

Reference is made to experiments in which tomato hybrids produced more and larger fruits as a result of adding pollen of *Nicotiana Tabacum*, *N. rustica*, wild and domestic potato varieties, or *Datura Tatula*, to the paternal pollen.

1527. Rick, C. M. and Robinson, J. **Inherited defects of floral structure affecting fruitfulness in *Lycopersicon esculentum*.** Amer. J. Bot. 1951 : **38** : 639–52.

Six highly unfruitful mutants showing gross abnormalities in floral structure are described. They possess the normal diploid number of chromosomes, and with one exception, each appeared to be determined by a simple recessive gene. In mutant *vg* all flower parts are reduced in size and number; the flowers are too deformed for normal self pollination. In *pi* unfruitfulness is caused by defective gynecia and complete absence of functioning stamens. Mutant *ap* has a greatly reduced corolla; its pollen is scarce and nonfunctional. Mutant cl_2 bears potentially functional pollen and gynecia, and flowers which do not open completely; self pollination is prevented by failure of the anthers to shed pollen. In *ex* the stigma in most flowers is exserted beyond the tip of the anther tube. In form Cl_1, dependent upon an incompletely dominant gene, the flowers are cleistogamous; unfruitfulness has not been satisfactorily explained. In some of the mutants multiple effects not only upon floral structure but also other parts of the plants have been observed. Mutant cl_2 might prove useful as a female parent in large scale hybridization.

1528. Murphy, E. F. and Covell, M. R. **Tomatoes in Maine.** Bull. Me. Agric. Exp. Sta. 1951 : No. 489 : Pp. 70.

Data are presented on the relative yield and carotene content of 82 varieties grown in different parts of Maine over 11 years. Some showed better adaptation to certain localities than others. Statistical analyses indicate that vitamin C content is directly related to light intensity and inversely dependent, to a lesser degree, on temperature. F_1 progeny of 14 crosses between wild strains of *L. esculentum* with high carotene content and commercial varieties averaged 120% more vitamin C than their cultivated parents.

1529. Bahl, A. N., Sadana, J. C. and Bashir Ahmad. **Carotenoid pigments of different cross-breeds of cultivated and wild varieties of tomatoes and the effect of further intervarietal crossing on the carotenoid content.** Indian J. Med. Res. 1949 : **37** : 183–92.

Wide variation was found in β-carotene and lycopene contents of five interspecific hybrid selections from *Lycopersicon esculentum* x *L. pimpinellifolium*, and the progenies of crosses between these selections. A relative increase in total carotenoid content occurred in Ts. 1 x Ts. 7 and Ts. 17 x Earliana.

1530. Hazina, E. P.
(The role of vegetative hybridization in breeding work).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V. I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 9 : 17–23. [Russian].

Experiments on vegetative hybridization of tomatoes at the USSR Institute of Breeding and Genetics, Odessa, are described. The aim was to breed an early high yielding tomato for outdoor cultivation with good quality fruits and showing resistance to bacterial diseases.
The initial variety was Humbert, whose conservative inheritance was shattered by grafting on nightshade stocks for two generations.
The resulting seed generations showed greater earliness and vigour than Humbert and their fruits were larger. Forms with large round fruits were selected, but these segregated again in respect of fruit characters. Young hybrid plants of the second seed generation were grafted on various stocks including Marglobe and *Caragana frutescens*. These hybrids have been named Marglobovyĭ [Margloboid] and Derezovyĭ [Caraganoid]. These hybrids produced larger fruits and were earlier and more productive than Humbert. The earliest and most productive plants with large well-shaped fruits were selected in the third seed generation, and proved earlier than Ficarazzi, Bison and Majak [Lighthouse].

1531. Vinogradov, P. I.
(Accelerating the maturity of tomatoes in Moldavia).
Agrobiologija (Agrobiology) 1951 : No. 3 : 52–61. [Russian].

A method, which promotes early maturity and involves Mičurinite training for hardiness of the material before it is transplanted to the field, has been developed at the Kišinev Agricultural Institute. Several varieties and lines have been bred, including Ranniĭ 30 [Early 30], B–84, Kišinevskiĭ 4 [Kišinev 4] and Frunze, which were submitted for trial in 1949. The most productive and the hardiest of these, B–84, yielding 3120 kg. fruits per ha., was obtained by vegetative rapprochement between intravarietal hybrids of Bison, a variety originating from the Gribovo Breeding Station, and *Solanum acaule*.

1532. Plačinda, S. I.
("Heterosis" of tomatoes in relation to capacity to withstand cold).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 4 : 16–21. [Russian].

Seed of Majak [Lighthouse] and Nosovskiĭ, pollinated by early varieties, was sown in the open in early spring for three years. The hybrid seedlings were able to withstand late spring temperatures of — 2·1° C and produced increased yields of early maturing fruits. Notable among the hybrids was Majak x Dessert; over 40% of its fruit was mature by the first of August.

1533. Kennerly, A. B.
Cracking resistant summer-set tomatoes.
Sth. Seedsman 1951 : **14** : No. 12 : 28, 65.

A review is given of breeding work in progress at Jacksonville, Tex., to develop varieties with good fruit-setting capacity in hot dry summers, commercially acceptable fruit and resistance to cracking and wilt.

1534. Gopalkrishna, N.
Breeding tomato resistant to *Fusarium* wilt.
Poona Agric. Coll. Mag. 1951 : **42** : 51–61.

Methods of breeding for disease resistance are outlined with special reference to research carried out since 1912 on *Fusarium* wilt of tomato.

1535. Schaible, L., Cannon, O. S. and Waddoups, V.
Inheritance of resistance to *Verticillium* wilt in a tomato cross.
Phytopathology 1951 : **41** : 986–90.

At Utah Agricultural Experiment Station, reaction to *V. alboatrum* has been investigated in F_1, F_2, F_3 and back cross progenies of reciprocal crosses between the wilt resistant W 6 (Peru Wild x Century) and Moscow, a susceptible variety. Results show that resistance is determined by a single dominant factor designated *Ve*.

1536. Watson, R. D. and Heinrich, E. C.
The inheritance of resistance to tobacco mosaic virus in interspecific tomato crosses.
Phytopathology 1951 : **41** : p. 944. (Abst.).

The F_1 of *Lycopersicon esculentum* (Sioux) x *L. hirsutum* was completely susceptible to tobacco mosaic virus. Plants from back crosses with Sioux also showed symptoms, but a ratio of three symptomless plants to one with symptoms was obtained by back-crossing to *L. hirsutum*. Correlation was found between expression of symptoms and virus concentration tested by the necrotic lesion method; the latter is recommended for making resistant selections. The negligible differences between virus concentration

in F_1 individuals indicate that both parents are homozygous for factors controlling reaction to the virus; only a few factor pairs appear to be involved.

1537. Finlay, K. W.
Hybrid vigour in tomatoes.
J. Aust. Inst. Agric. Sci. 1951 : **17** : 145–51.

Data are presented on the yield produced early in the season, total yield, fruit size and combining ability of 11 varieties and 11 F_1 hybrids resulting from crosses made at the Institute of Agriculture, Western Australia. Significant yield increases were observed in all hybrids; Wanneroo Late x Prosperity yielded 51·1% more than Wanneroo Late, the outstanding local commercial variety. Fruit size generally approximated the mean of the parental fruit sizes.
Back crosses are being made to incorporate male sterility in some of the promising parent varieties.
A high degree of resistance to spotted wilt was shown by Pearl Harbour x Rey de los Tempranos [King of the Earlies].

1538. Leggieri, L.
Prove di adattamento in Campania su varietà di pomodoro da mensa. (**Adaptation trials in Campania with table varieties of tomato**).
Ann. Fac. Agr. Portici Univ. Napoli 1949–50 : **18** : 113–39.

Ten varieties, including two Italian, Meraviglia del Mercato [Marvel of the Market] and Immune [Immune] were studied with reference to yield and resistance to various diseases and cracking. Results were conflicting but the study of the best adapted varieties should be continued as a basis for future selection and breeding.

1539. Hanisch, H.
Einiges über Leguminosenzüchtung. (**Some points concerning breeding Leguminosae**).
Z. Pflanzenz. 1951 : **30** : 394–404.

A number of desiderata in pea breeding are enumerated. The author has succeeded in increasing the yield of green matter of early peas by crossing them with the small-seeded Angern fodder pea. His experience has not confirmed the suggestion that early maturity affords a protection against attack by *Bruchus pisi*. *Pisum arvense* has been used as a parent in breeding for winter hardiness.
In *Phaseolus*, stringy mutations have been observed repeatedly in the stringless varieties Wachs Goldhorn and Meisterstück [Masterpiece] but only rarely in Saxa; different lines have varied in the frequency with which they showed mutation. Although forms with yellow pods are more popular, they are actually no better in quality and somewhat less vigorous and less resistant to anthracnose than the green forms.
By selection in the Angern soya bean a form free from the usual bitter principle in the seed has been produced, and selection in the runner bean Meisterstück has led to an improvement in resistance to anthracnose and virus. Selection within a mixed hybrid population of lentils has given rise to a large seeded form with a 1000 seed weight of 80 grm.

1540. Bernstein, L. and Ayers, A. D.
Salt tolerance of six varieties of green beans.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 243–48.

Giant Stringless Green Pod, Ranger and Tendergreen gave higher yields than other varieties grown under saline conditions at the California Agricultural Experiment Station; although Asgrow Black Valentine produced low yields its bean quality was least affected.

1541. Frimmel, F.
Die Remontierfähigkeit der Buschbohnen. (**The capacity for continuous bearing in dwarf beans**).
Z. Pflanzenz. 1951 : **30** : 387–93.

Control plants left untouched formed an average of 4·9 ripe pods per plant in the variety Sans Rival [Unrivalled] and 5·7 in Flageolet Wachs [Flageolet Wax]. If all flowers were removed as soon as they formed, both varieties produced a mass of new flowers, in three main waves at intervals of several weeks. If however the flowers were removed only when the earliest of them had formed pods ready to pick, the variety Flageolet Wachs was stimulated to form new flowers whereas Sans Rival was not. Moreover, in Sans Rival removal of flowers had no effect as long as one developing pod remained on the plant, whereas floral development in Flageolet Wachs was stimulated by removal of any of the flowers. This variety is normally a so-called intensive or garden variety, which ripens its pods one after another, whereas Sans Rival is an extensive variety with simultaneous ripening of all pods.

1542. Hildreth, R. C.
The use of resistant selections, hybrids, antibiotics, and other direct measures for the control of bacterial blight of beans.
Univ. Wyo. Publ. 1951 : **26** : 138–39. (Abst.).
Numerous halo blight resistant selections were made during trials on material from the Cheyenne Horticultural Field Station; 14 were crossed with commercial varieties possessing desirable agronomic characters.

1543. Wilson, R. D.
Anthracnose of French beans.
Aust. Plant Dis. Recorder 1951 : **3** : p. 49. (Mimeographed).
Further information is given on the occurrence of anthracnose strains 1 and 2 in Australia (cf. Abst. 836). The strains can be distinguished by the reaction of the beans Tweed Wonder and Wellington Wonder, both varieties being resistant to strain 1 but susceptible to strain 2.

1544. Thomas, H. R.
Yellow dot, a virus disease of bean.
Phytopathology 1951 : **41** : 967–74.
No resistance to the yellow dot virus was found among 45 bean varieties tested under greenhouse conditions at Beltsville, Md. Results of cross protection inoculations suggest that the pathogen is a strain of lucerne mosaic virus.

1545. Bridgmon, G. H. and Walker, J. C.
The relation of southern bean mosaic to black root.
Phytopathology 1951 : **41** : 865–71.
An investigation at Wisconsin University concerning varietal resistance in *Phaseolus vulgaris* after inoculation with bean viruses 1 and 4 has shown that necrosis resembling black root symptoms (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1413) developed on varieties resistant to southern bean mosaic. On these varieties, deriving resistance from different sources, necrosis induced by virus 4 was reddish brown to black, while that due to virus 1 was grey to black. Varieties susceptible to southern bean mosaic remained free from both forms of necrosis associated with black root after inoculation with both viruses.

1546. Wester, R. E. and Jorgensen, H.
Hybrid vigor of Lima beans.
Proc. Amer. Soc. Hort. Sci. 1951 : **57** : 305–09.
Data are presented on the green plant weight, number of pods and seeds per pod, yield of dry seed per plant and average weight per seed of parents and F_1 generations of crosses in which Clark's Bush was pollinated with Early Market, Peerless, Triumph and Henderson at Beltsville, Md. The F_1 of Clark's Bush x Triumph showed hybrid vigour in respect of four of the five characters studied. Close genetical relationship between Clark's Bush and Henderson is thought to account for total absence of hybrid vigour in their F_1 progeny.

1547. Sherwin, H. S. and Lefebvre, C. L.
Reaction of cowpea varieties to bacterial canker.
Plant Dis. Reporter 1951 : **35** : 303–17. (Mimeographed).
Xanthomonas vignicola was pathogenic to most varieties of *Vigna sinensis*, but not to the varieties of *Phaseolus vulgaris* tested, with the exception of Red Kidney. *X. phaseoli* was pathogenic to all bean varieties studied, but did not produce typical blight symptoms on any cowpea varieties. Different methods of inoculation with *X. vignicola* were compared for their efficiency. Among the named varieties of *V. sinensis* tested for their reaction to *X. vignicola*, Brabham, Buff, Iron, Six-weeks-Ala. (SCP 9), Suwannee and Victor were found to be immune or highly resistant. Two strains of *X. vignicola* were discovered.

1548. Fukui, J. and Arai, M.
(Ecological studies on Japanese soya bean varieties. I. On the classification and geographical differentiation of soya bean varieties with reference to flowering period and maturation period).
Ikushugaku Zasshi / Jap. J. Breeding 1951 : **1** : 27–39. [Japanese].
A large collection of Japanese soya bean varieties, with the addition of some material from Manchuria, Korea and the USA, was investigated in respect of flowering and maturation periods at Konosu (Japan). In general, both flowering and maturation periods were associated with latitude, the earliest Japanese varieties coming from the north, i.e. the island of Hokkaido.

1549. Parker, M. W. and Borthwick, H. A.
Photoperiodic responses of soybean varieties.
Soybean Digest 1951 : **11** : No. 11 : 26–30.
The effect of a 1·5 hours difference in photoperiod on location of the first flower bud and terminal inflorescence, number of days to the

opening of the first flower and length of time from opening of flowers to production of pods 2 cm. in length varied with each of six varieties. Further investigations using soya beans now in common use are advocated so that varieties may be grown in areas where the day length promotes the best performance.

1550. KAWAKAMI, K.
(The soya bean variety Chamame 1).
Nogyo Engei (Agric. Hort.) 1949 : **24** : p. 732. [Japanese).

A description is given of the new variety Chamame 1 (Tea Bean 1), a selection from local material distinguished by its superior flavour.

1551. WEISS, M. G.
More and better soybeans through research.
Soybean Digest 1951 : **11** : No. 11 : 24–25.

The main characteristics of varieties which have shown adaptation to different parts of the USA are briefly outlined. Several promising lines are undergoing trial in the upper Mississippi delta area for which, as yet, no improved varieties have been released. It is probable that resistance to *Xanthomonas phaseoli* var. *sojense, Pseudomonas glycinea, Ps. tabacum, Helminthosporium vignicola* and *Cercospora sojina* will be incorporated in future commercial varieties.

1552. CARLSSON, G.
Jämförande försök med märgärtsorten Debut/49. **(Comparative trials with the marrow fat pea variety Debut/49).**
Medd. Gullåkers VäxtförädlAnst., Hammenhög 1951 : Nos 7–8 : 174–77.

From a cross of Kelvedon Wonder and World's Record, Debut/49 has been raised at Gullåker Plant Breeding Station; this new short pea has proved earlier than Kelvedon Wonder and is the earliest Swedish marrow fat variety so far known.

1553. CARLSSON, G.
Jämförande försök med sockerärten Sylvester/49. **(Comparative trials with the sugar pea Sylvester/49).**
Medd. Gullåkers VäxtförädlAnst., Hammenhög 1951 : Nos 7–8 : 177–79.

This pure line selection from an unknown cross is a medium tall pea outyielding Midsommertriumf OE/44 [Midsummer Triumph OE/44] and Norrlands Express OE/47 [Norrland Express OE/47] by 23 and 29% respectively. It is also earlier than Midsommertriumf OE/44.

1554. **New winter field pea released.**
Crops and Soils 1951 : **4** : No. 1 : p. 30.

Romack, a new winter field pea developed by the Georgia Agricultural Experiment Station, has greater vigour and matures earlier than the Austrian winter pea. It is well suited to the Pacific Northwest.

1555. LAMPRECHT, H.
Über partielle und Semisterilität, insbesondere bei *Pisum sativum.* **(Partial and semi sterility, particularly in *P. sativum*).**
Z. Pflanzenz. 1951 : **30** : 422–33.

The various internal factors, physiological, cytological and genetical, which may reduce fertility are discussed by reference to published data. Further crosses are mentioned in which the author has observed degrees of sterility of 25, 37·5, 50, 62·5 and 75%, as well as more complex relationships, resulting from interchanges in different chromosomes and their combinations.

1556. POLUNIN, JA. JA.
(New vegetative hybrids of the processing varieties of pea).
Agrobiologija (Agrobiology) 1951 : No. 4 : 110–15. [Russian].

The first seed generations of the vegetative grafts made at the Moscow Research Breeding Station (cf. *Plant Breeding Abstracts,* Vol. XXI, Abst. 2279) have been studied. Several examples of heritable changes in the grafts 14ja Linija [14th Line] on Lord Robert and Ranniĭ Mozgovoĭ [Early Marrowfat] on Kelvedon Wonder are given. The evidence suggests that changes in the size and colour of the seed occur more frequently than changes in plant habit and the character of the pod. Analyses of the yield characters showed that the vegetative hybrids produced more pods per plant and more and larger seeds in the pods than the initial scion varieties. The hybrid Ranniĭ Mozgovoĭ on Kelvedon Wonder yielded 26% more seed and 14ja Linija on Lord Robert 53% more seed than the respective scion varieties. In the former instance the 1000 seed weight was 3·3 grm. and in the latter 32·3 grm. higher. It was found that the 1000 seed weight of the vegetative hybrids was correlated with the size of the seed of the stock.
It is concluded that the effect of grafting upon processing varieties of pea is comparable to that of cross pollination. It is hoped to produce more extensive changes in the material by grafting it again on the same stocks.

1557. Mühleisen, R.
Untersuchungen über den Blüten- und Hülsenansatz sowie über die Qualität der Erbsen. (**Investigations on the set of flowers and pods and also on the quality of peas**).
Z. Acker- u. Pflanzenbau 1951 : **94** : 59–98.

Characteristics relating to yield and quality were studied. Both *Pisum sativum* and *P. arvense* were used in the 2-year comparative experiments. It was found that the ash content and the proportion by weight of seed coat are varietal characters.
No relation exists (1) between the 1000 seed weight and the absolute, or the relative, increase in volume on swelling, (2) between the protein content and the increase in weight or volume after 48 hours' swelling, and (3) between cookability and the absolute increase in volume or the percentage increase in weight, in each case after 48 hours' swelling.
A slight negative correlation exists between the 1000 seed weight and the ash content, and it seems there is also a negative correlation between the 1000 seed weight and the proportion by weight of seed coat present. Neither the 1000 seed weight nor the proportion of seed coat affects the crude protein content. The pure protein content is independent of the corresponding crude protein value and from the relevant results the author concludes that the number of factors controlling the formation of pure protein is greater than the number which condition the formation of crude protein. The application to plant breeding of these results relating to characteristics concerned with quality is discussed. It is emphasized that breeding for protein is essentially a matter of increasing the protein yield per hectare and this decisive factor, rather than the protein content, must be the criterion in selecting breeding strains. Since no negative correlation was found between protein content and seed yield, it should be possible to obtain a high protein content with a high seed yield.

1558. Pariškura, I. S.
(**Methods of producing intervarietal hybrids of peas**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 3 : 48–54. [Russian].

Seeds of the maternal variety are sown thickly in rows alternating with rows of several varieties which are to provide the pollen, so that a comparatively large proportion of maternal plants are cross-pollinated. Hybrid seed, forming some 5% of the total yield, is generally distinguishable from the non-hybrid seed in colour and size and therefore readily separable.
Victoria Mahndorf, a variety susceptible to *Ascochyta*, and Capital, having small seeds, are especially recommended for hybridization.

1559. Försök med sprit- och märgärter i södra och mellersta Sverige. (**Trials with shelling and marrow fat peas in southern and central Sweden**).
Försök och Forskning 1951 : **8** : 68–69.

Nyhlén, A.
Försök med sprit- och märgärter i södra och mellersta Sverige år 1938-1948. (**Trials with shelling and marrow fat peas in southern and central Sweden in the years 1938-1948**).
Medd. Stat. Trädgårdsförsök 1951 : No. 67.

A detailed report is presented on the performance of 34 varieties of peas at ten different experimental centres in Sweden during the period 1938–1948 (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts 2204 and 2205 and Vol. XXI, Abst. 3154).

1560. Nilsson, F. and Larsson, G.
Sortförsök med köksväxter i Norrland. VI. Märg- och spiritärter 1939–1948. (**Variety trials with vegetables in Norrland. VI. Marrow fat and shelling peas, 1939-48**).
Medd. Stat. Trädgårdsförsök 1951 : No. 66 : Pp. 47.

Amplifying and completing the report on the result of pea trials in Norrland (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 3154), this communication gives full details of the performance and regional suitability of tall, medium tall and dwarf varieties of wrinkled-seeded and round-seeded peas tested in many localities in Sweden.

1561. Chavan, V. M. and Argikar, G. P.
Three new economic types in Bengal gram (*Cicer arietinum* L.).
Indian Fmg. 1950 : **11** : 539–40.

Improved strains recently developed at Dharwar and Bailhongal, Bombay, include Improved Bold, a large-seeded selection from a cross between two types with medium sized black and brown seeds respectively. The seeds of Improved Bold are yellow like those of the locally grown Chafa, and mature at the same time, but the yield significantly exceeds that of Chafa.
A low-growing type with a spreading habit, and

a strain with green seeds from which green flour is obtained are also described.

1562. **New sweet corn developed.**
Crops and Soils 1951 : **4** : No. **2** : p. 27.
Further reference to the release of Hoosier Gold (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2468) mentions that this variety resulted from controlled pollination between C 30 and Purdue G 8.

1563. GALINAT, W. C.
Glumeless hybrid sweet corn and the use of the *Vg* gene in producing crossed corn.
J. Hered. 1951 : **42** : 115–16.
The adverse effect of glumes upon sweet corn quality is discussed. The glumeless character depends upon the dominant gene *Vg*. Strains carrying this factor are male sterile, since exposure of the immature anthers to direct sunlight kills the pollen. For pollen production the tassels have therefore to be protected by mechanical means. By back-crossing, modified *Vg* types have been obtained whose tassels bear glumes a third to two-thirds the normal length and shed pollen as abundantly as normal tassels. The ear glumes are however reduced to a mere vestige or are not long enough to form undesirable chaff. The *Vg* gene may also be useful in the development of male sterile, unmodified glumeless lines for the elimination of detasseling in hybrid seed production.

1564. HASKELL, G.
Studies with sweet corn. The frit fly problem.
Bull. Ent. Res. 1951 : **42** : 519–26.
Variation in degree of susceptibility to *Oscinella frit* observed in open-pollinated, hybrid and inbred lines of sweet corn grown at Merton, Surrey, from 1946 to 1949, indicates that resistance is polygenetically controlled. Selection for increased seedling resistance on lines similar to the techniques used in Argentina to develop locust resistant maize is under way; particular use is being made of varieties capable of producing numerous tillers to replace a damaged main stem. Assuming that the repellent characteristic of locust resistant maize also repels frit flies, locally grown sweet corn varieties are to be crossed with maize possessing locust resistance, and back-crossed to sweet corn.

BOOK REVIEWS

KENDALL, M. G.
Rank correlation methods.
Charles Griffin & Co. Ltd., London 1948 : 18s. : Pp. 160.
There are occasions in practical experimental work when it is not possible to give objective measures to the characters under examination; in such cases the individuals may be *ranked*, or put in order, with respect to one or more qualities. The same procedure may be used as a time-saving device even when numerical observations are available. The problem of correlation between characters then comes in. This is a branch of general correlation theory which has now attained such dimensions that it has been found needful to write a separate text-book to deal with the topic. The subject is one in which there has been much recent development, and pretty well all that is known to date regarding rank correlation finds a place in these pages, together with the necessary tables. The book is very readable, even to the non-mathematician. The device of interpolating chapters to give mathematical proofs of the results of previous chapters enables the beginner, or anyone unable to cope with the mathematics, to devise for himself a clear-cut system of reading by leaving out such chapters. On the other hand the mathematician knows where to go to find his proofs. J. W.

MANN, H. B.
Analysis and design of experiments.
Dover Publications, Inc., New York 1949 : $2·95 : Pp. x + 198.
There are by now a number of books available which deal with the design of experiments from the general descriptive point of view, which is what the average plant breeder requires. This is believed to be the first text-book in which the formal mathematics associated with the subject is set out in detail. Essentially a book for the mathematician, it appears to cover the whole ground, including the necessary preliminary mathematics, such as the use of matrices and quadratic forms, and the main sampling distributions associated with this part of statistical theory. Its value lies in supplementing, for the benefit of the mathematician, the ordinary descriptive textbook by supplying proofs; taken alone it cannot be regarded as fully sufficient, because it leaves out so much of

the practice of the subject. In particular, no one, not even a mathematician, can hope to understand what the analysis of covariance is about by reading the two-page chapter XIII, a rather bad example of perfunctoriness.

J. W.

Udny Yule, G. and Kendall, M. G.
An introduction to the theory of statistics.
Charles Griffin & Co. Ltd., London 1950 : 14th ed. : 34s. : Pp. 689.

The classic text of Mr G. Udny Yule, late Lecturer and first Reader in Statistics in the University of Cambridge, was "made over" after twenty-five years, and the eleventh edition appeared under the joint authorship of Mr Yule and M. G. Kendall, now Professor of Statistics in the University of London. The opportunity was taken to incorporate much of the twentieth century developments in statistical tests. This trend has continued with the appearance of a fourteenth edition, for chapters have been added on The Analysis of Variance, Some Problems of Practical Sampling, Index Numbers and Time-series (two chapters). Two early chapters of the older editions have been omitted, but even so the book is by now attaining a formidable length, and there is probably room for further pruning in future editions. Broadly, the book may be described as one of the most complete and comprehensive textbooks on statistical methodology in existence, and may be confidently recommended to the student with only modest attainments in mathematics. In particular, the chapters on analysis of variance and on practical sampling problems will be of material assistance to the plant breeder engaged in carrying out field trials.

J. W.

AScW Report on the Lysenko controversy.
Association of Scientific Workers, London 1951 : 1s. : Pp. 20.

A subcommittee of the Science Policy Committee of the British Association of Scientific Workers was set up in 1949 to report on the Lysenko controversy. The present 20-page pamphlet is the outcome of their two years' deliberations.

The report is a model of neutrality and provides a useful introduction to the literature on the subject. Neutrality, however, may be either positive, when achieved by impartial analysis and criticism of each of the contending points of view, or negative, when achieved by refraining from analysing or criticizing any point of view. It would be unfair to characterize the present report as wholly negative, but the way it contrives to survey so complex a field while coming to grips with so few concrete issues is remarkable. The pamphlet only alludes to selected aspects of the new Soviet genetics and the reader will gather from it very little of the real complexity of the present Soviet theory. Still, what is said does not mislead, and the references cited will guide the interested reader to more comprehensive publications.

Sirks, M. J.
Handboek der algemene erfelijkheidsleer.
(Handbook of general genetics).
Martinus Nijhoff, The Hague 1951 : 5th ed. : 28·50 guilders : Pp. 644 : 235 figs.

This Dutch handbook of genetics is now in its fifth edition and has been enlarged to include data published during the war years. These have been referred to in most cases quite briefly, with indications of sources from which the reader may obtain fuller information, and the main interest of the book resides in the fact that it gives an historical picture of the early development of genetical thought on the various subjects treated. These cover a wide range of phenomena in both the plant and animal kingdoms. After a general introduction, a scholarly outline is given of the researches of the pre-Mendelian school, culminating with Weismann, who forestalled the chromosome theory of inheritance, and of the early hybridizers, such as Camerarius, Kölreuter, Knight, Seton, Goss, Gaertner and, most important of all, Naudin, whose system can be described as Mendelism without the firm mathematical basis.

Next come a series of chapters presenting classical Mendelism, passing on to the chromosome basis of inheritance, and the contributions of later techniques such as salivary gland studies and colchicine treatment. Then come sections devoted to the nature of gene action, the role of the cytoplasm, chimeras and chromosome behaviour. Sex determination is analysed clearly and objectively in chapter XVIII and the inheritance of acquired characters in chapter XIX. Here a very cautious attitude is taken and the discussion is again confined largely to the results of the earlier workers, with only passing references to more recent studies on microorganisms and the Russian genetics controversy.

The theory of pure lines and population genetics too are treated very objectively, as are the phenomena associated with inbreeding and heterosis, the explanation for which is sought in a combination of the effects of nuclear and plasma genes. A useful chapter is devoted to

the mechanism of gene action, instances being quoted of complex effects which may result from the action of a single gene or a small number of genes, operating in association with developmental velocity differences or in varying dosages. The treatment of chemical effects suffers again from the very scant reference made to the extensive data now available in this field from the study of microorganisms.

The final chapter points out the interrelationships between genetics and other sciences such as physiology, medicine, taxonomy, plant and animal breeding and even philology.

The book is attractively written and printed on excellent paper; it uses the new spelling and is on the whole very accurate, though a few typographical errors have remained and the author Bělař seems to have caused the printer particular embarrassment. With the above reservations it can be recommended to students to whom Dutch is the mother tongue.

WINCHESTER, A. M.
Genetics. A survey of the principles of heredity.
Houghton Mifflin Co., Boston 1951 : $5·00 : Pp. x + 371 : 231 figs.

The book under review is not quite the usual type of textbook, for the author uses what might be termed the advertising technique. That is to say he does not assume that his readers are already interested in learning genetics but aims to arouse and maintain the interest of those who are not, by using every device to make the subject as attractive as possible. Thus more space is devoted to human genetics than in most elementary textbooks; and there are very numerous illustrations which are a striking feature of the book, and if they do not all teach the student anything which could not be adequately expressed in words alone they at least catch the attention of anyone flicking over the pages so that he stops to read a passage here and there.

The popular approach is not to be derided but rather considered an advantage, for the book fulfils its purpose admirably. It is not a survey of important advances in genetics so much as an explanation of the principles of heredity and their application, using as examples work on familiar plants and animals. For information on the present state of knowledge concerning the genetics of particular organisms other than man one should look elsewhere.

Nuclear division is discussed before Mendelian ratios, which seems to be the best order of presentation. At the ends of the chapters problems are listed which are useful for checking whether the information has been understood. Especially noteworthy is the chapter on probability and heredity in which the use of the laws of coincident happenings, the calculation of the standard error and the χ^2 method of determining fit are very clearly explained. The mathematical reasoning to support the equations is not gone into. A discussion of the effects of atomic radiation with reference to the probable genetical consequences of atomic warfare is also of special interest. On the subject of eugenics the author puts forward impartially the arguments for and against various measures which have been advocated. A list of selected references and an index are provided.

M. T.

KNAYSI, G.
Elements of bacterial cytology.
Constable & Co. Ltd., London and Comstock Publishing Company, Inc., New York 1951 : 2nd ed. : 40s. : Pp. xviii + 375 : 123 figs : 21 tables : 49 plates.

Professor Knaysi's book is primarily a textbook for students of bacteriology but it will also be useful to other biologists as a reference book. In addition to reviewing present day knowledge of the structure and composition of the bacterial cell, the author has collected information on the physiochemical properties of bacterial membranes, vegetative reproduction, the motion of bacteria and types of cultures. So as to include an adequate account of research published since the first edition appeared in 1944 (cf. *Plant Breeding Abstracts*, Vol. XV, p. 373), several of the chapters have been rewritten. The nucleus now has a whole chapter devoted to it in which the demonstration of nuclei in various species, the structure, behaviour, chemical composition, properties, dimensions and number of nuclei per cell, and the evidence concerning nuclear division are discussed, as well as recent improvements in the technique of studying bacterial nuclei. As in the first edition, chapters on the cytology of the Actinomycetes, spirochetes and Myxobacteria are included. There are numerous illustrations, including electron micrographs, photomicrographs and diagrams. A bibliography and an index are appended.

M. T.

CLELAND, R. E.
Studies in *Oenothera* cytogenetics and phylogeny.
Ind. Univ. Publ. Sci. Ser. 16 1950 : $4 : Pp. 348 : figs : tables : illus.

It is well known that in *Oenothera*, owing to the presence of reciprocal translocations, chromosome rings occur at meiosis. When complexes

with similar arrangements of end segments are brought together in a hybrid, pairs or small circles are formed, whereas complexes which are unlike in their segmental arrangements tend to form large circles. Thus the size of the circles in a hybrid is an indication of the degree of dissimilarity between the segmental arrangements of the complexes of the parents.

This fact has been used in the studies reported here, in order to determine the segmental arrangements of the complexes of various races of *Oenothera* in terms of a standard complex. It is assumed, as a working hypothesis (the validity of which is discussed), that complexes with similar or identical end arrangements are, as a rule, closely related phylogenetically, and *vice versa*, and on this basis information on phylogenetic relationships has been obtained. This has been correlated with phenotypic characteristics and geographical distribution.

It is found that the North American races of the subgenus *Euoenothera* fall into seven phylogenetic groups, each with distinctive phenotypic, geographic, genetical and cytological characteristics, except two that are indistinguishable phenotypically. With rare exceptions, each race is made up of self-pollinating individuals with a ring of 14 chromosomes and balanced lethals and is therefore typically true breeding and more or less isolated from surrounding races. Most have arisen as a result of hybridization between existing races, as is borne out by the presence of complexes with similar or identical segmental arrangements in different races. The evident survival value of rings of 14 relative to other configurations probably depends largely on the fact that their presence makes possible maximal hybrid vigour with a minimum loss of fertility.

Raimannia and other subgenera and South American races of *Euoenothera* have also been studied. Reciprocal translocation is shown to be a widespread phenomenon in the genus.

M. T.

TISCHLER, G.
Handbuch der Pflanzenanatomie. Band II. Allgemeine Pflanzenkaryologie. 2 Hälfte: Kernteilung und Kernverschmelzung. (**Handbook of plant anatomy. Vol. II. General plant caryology. 2nd Half: Cell division and cell fusion**).
Naturwissenschaftlicher Verlag (Gebrüder Borntraeger), Berlin-Nikolassee 1951: 2. Lieferung 48 M: Pp. 385–720: 231 figs; 3. Lieferung DM 32: Pp. vii + 721–1040: 5 figs.

The second half of Professor Tischler's book on *General Plant Caryology*, devoted to cell division and cell fusion, was completed at the end of 1943 and this edition therefore contains no reference to works published since that date. These will be dealt with later in an Ergänzungsband [Supplementary Volume]. Even during the printing which began early in 1941, a number of works came to the author's notice which were published during the war years and not previously available for consultation; they are referred to in a series of *addenda* on pp. 726 to 760. These various factors naturally detract from the continuity of the work, of which we now receive the two final volumes, and its main interest lies in the detailed historical account it gives of studies on every single phase of the meiotic process, beginning with the splitting of the chromosome threads and ending with the completion of cell division; this account is followed by an equally detailed description of the phenomena of cell fusion.

Except in the case of views that have been undeniably superseded, the evidence of all authors on a particular phenomenon is analysed fully, often with quotations from the original text, particularly if this was in French, English or German, and many figures are also reproduced. The bibliography to the second half alone covers 230 closely printed pages. This is followed by an author index covering 32 pages, an index of species, genera and families, and a subject index. Students will undoubtedly find in these volumes an invaluable source of reference to the earlier literature on meiosis, normal and abnormal, and cell fusion, not only in the higher plants but also in the thallophytes.

STRAUB, J.
Wege zur Polyploidie. Eine Anleitung zur Herstellung von Pflanzen mit Riesenwuchs. (**Methods of inducing polyploidy. A guide to the production of plants with giant growth**).
Naturwissenschaftlicher Verlag (Gebrüder Borntraeger), Berlin-Nikolassee 1950: 2nd ed.: DM 2·80: Pp. vii + 31: 11 figs: 1 table.

Professor Straub's small booklet on the methods of producing polyploid plants was first published in 1941 and the second edition has been somewhat enlarged in the light of the many data that have accumulated since that time. For the benefit of the nontechnical reader a general account is given of the methods of inducing polyploids by treatment with colchicine, with indications of the treatments found most suitable for particular plants. Similar information for acenaphthene and temperature treatments

follows. The methods of distinguishing the polyploid offspring are described and in the concluding chapter it is pointed out that polyploidy alone usually confers no advantage to a pure species, except in special cases where it is desired to increase the size of a particular organ or delay a particular stage of development. The chief advantages are seen to be in treating hybrids, whereby sterility can be reduced, the possible gene combinations increased, and in certain cases heterosis fixed.

LLOYD, B.
A dictionary of botanical terms.
University of London Press Ltd., London 1950 : 2s. 6d. : Pp. 64 : figs.

The glossary of botanical terms under review is designed for botanical students from matriculation to first year university levels. It is clearly set out, with succinct definitions, and is embellished with good line diagrams. Etymologies are not given, the author pleading the decreased knowledge of Latin and Greek as the reason. This diminishes the value of the book. Without some etymological help, biological terminology becomes a mnemonic nightmare. It is not in the least necessary either to have a classical background to make use of etymology, for the terms themselves supply a vocabulary, and the principles of word construction can be learnt in ten minutes.

It is perhaps the elimination of etymology that has led the author to confuse, in a few cases, analytic and etymological definitions of terms. For instance, though *κρυπτός* means *hidden* in Greek, it is incorrect to define a cryptogam as a plant with *obscure* reproductive organs. Rather more serious, while microspore means a small spore etymologically, it should be defined botanically in terms of the activity of its gametes. The author's definition in terms of lesser size compared with the megaspore is at fault, since the microspore may be the larger.

The definitions are usually good but there is some circularity as with *capsule*, "the theca of a moss", and *theca*, "capsule of mosses", and occasionally a slip, as when the caryopsis is described as "a dry one-seeded indehiscent fruit with a thin pericarp", not mentioning the attachment of the testa to the pericarp, and with a diagram in which the embryonic epidermis is labelled as the testa.

TRUOG, E. (Editor)
Mineral nutrition of plants.
University of Wisconsin Press 1951 : $6·00 : Pp. xiii + 469 : figs : tables : illus.

There are 22 contributors to this symposium, which covers various aspects, both theoretical and practical, of the mineral nutrition of plants. These include: the soil as a source of nutrients; the availability of nutrients to plants; the mechanism of entry and translocation of minerals in plants; field problems in plant nutrition; the role of minerals in plant nutrition; and the influence on mineral nutrition of light, soil moisture and other factors.

T. C. Broyer, in his paper on the nature of the process of inorganic solute accumulation in roots, stresses that in addition to the external conditions there are genetically determined internal conditions which affect the rates and extent of inorganic solute absorption. "Environmental conditions", he says, "may alter internal conditions and processes within an organism, but the extent of the effect will be limited by its genetic potentialities". An interesting difference in varietal response to soil moisture discovered by Wimmer, Sammet and Lesch is mentioned in another paper. While one variety of sugar beet showed the usual decrease in potassium content with decreasing moisture supply, another showed the reverse trend under the same conditions.

There are three papers devoted to particular crops: one on the control of the responses to nitrogen of McIntosh apple trees, another on environmental influences on the growth of sugar cane, and a third on the production of vegetable crops for canning. M. T.

KOMAROV, V. L., ŠIŠKIN, B. K. and BOBROV, E. G.
(Flora of the USSR).
USSR Acad. Sci., Leningrad 1945 : **11** : 30 roubles : Pp. xvii + 432 : 25 figs; 1946 : **12** : 60 roubles : Pp. xxviii + 918 : 50 figs; 1948 : **13** : 40 roubles : Pp. xxiv + 588 : 26 figs; 1949 : **14** : 55 roubles : Pp. xxiv + 790 : 39 figs; and 1949 : **15** : 45 roubles : Pp. xxiii + 742 : 33 figs.

The last volume of the *Flora of the USSR* reviewed in these pages was Volume X (cf. *Plant Breeding Abstracts*, Vol. XI, p. 335). Five further volumes have now been received: Volumes XI, XII and XIII, dealing with the *Leguminosae* (Volume XII dealing solely with the 849 species of *Astragalus* found in the Soviet Union); Volume XIV, covering the Geraniales, Sapindales and Rhamnales; and Volume XV, describing the Malvales, Parietales and Myrtiflorae.

Many of the genera treated have been carefully revised, and special notes are given on species of economic value. As in previous volumes, Latin

diagnoses of new species appear in addenda at the end of each volume. Among the new species described are members of the genera *Astragalus, Oxytropis, Onobrychis, Vicia, Linum, Empetrum, Acer* and *Trapa*.

As in the earlier volumes, the taxonomic treatment is on the whole conservative, and the editors have avoided the current abuse of splitting genera just because they are large. The volumes are easy to consult, even for those ignorant of Russian, and the latest volumes make a further notable contribution to our knowledge of the world flora.

TISSERANT, P. CH.
Catalogue de la flore de l'Oubangui-Chari. (**Catalogue of the flora of Oubangui-Chari**).
Mem. Inst. Étud. CentAfr. No. 2 : 1950 : Pp. 165 : 1 map.

This flora has been compiled by the industry of P. Ch. Tisserant of the Bangui Mission, who also holds the post of botanist at the Central Station for Agriculture in French East Africa, while at the same time acting as correspondent of the Paris Natural History Museum.

Part I deals fully with questions of nomenclature and the difficulties encountered in identifying and naming plants scientifically from their vernacular designations and available specimens or fragments.

Not all the plants have a vernacular name and the reasons underlying the allotment of native names to plants may lead to different plants being called by the same name.

A short section in the appendix to Part I deals with the phonetics of vernacular names, and another with the names of the peoples, tribes and dialects cited, while the third and concluding part of the flora gives a 52-page alphabetical list of French names, their vernacular equivalents, and the corresponding Latin names. The flora proper, which forms Part II of the work, covers 100 pages and is arranged alphabetically under families.

SCHINDLER, L.
Die Landwirtschaft. Band II. (**Agriculture. Part II**).
Bayerischer Landwirtschaftsverlag GMBH 1951 : DM 16·20 : Pp. 1013 : figs. : tables : plates : illus.

This agricultural handbook for students and farmers begins with a chapter on plant breeding by Dr. E. Ulonska, in which the contributions of plant breeding to the improvements in agricultural plants are illustrated by reference to the work of the plant breeding institute at Weihenstephan in Bavaria, founded in 1902. The cooperation which now exists between this station and the private breeders is described, a brief popular account is given of the scientific basis of plant breeding and of the practical methods employed, some of the most outstanding achievements are enumerated and the technique of dealing with certain special problems such as quality and disease resistance is considered.

In the succeeding chapters each of the main crop plants is considered in turn, with descriptions of its botanical features, uses, methods of cultivation, characteristics of the main varieties, the principal diseases and pests and their control.

Permanent grass forms the subject of the eighth chapter, fruit and vegetables of the ninth, and forestry of the tenth; the rest of the work is devoted mainly to questions concerned with livestock and with general farm management.

The volume is attractively presented and copiously illustrated throughout, many of the illustrations being of a very high quality, some of them in colour. Some useful statistics are given in the final section.

MILLAR, C. E. and TURK, L. M.
Fundamentals of soil science.
Chapman & Hall, Ltd. and John Wiley & Sons, Inc. 1951 : 2nd ed. : 44s. : Pp. x + 510 : 102 figs : 58 tables.

The purpose of this book is fourfold: to familiarize the reader with soils as natural units or entities and with their inherent characteristics; to demonstrate the significance of fundamental soil properties; to set forth basic relationships between soils and plants; and to make clear the principles involved in the use and conservation of the soil. It is concerned with theory more than with practice, and covers the development of soils, their physical properties, classification and chemical properties, the pH of soils in relation to plant growth, the liming of soils, soil moisture, soil organisms, organic matter, cover and green manure crops, farm manures, the nutrient requirements of plants, fertilizers and their use, soil conservation, the maintenance of fertility, soil productivity rating, soils of arid regions, and the soil resources of the United States. Thus it will be of interest to a variety of people concerned in one way or another with agriculture, especially in America.

The use of frequent subheadings and lists of questions drawing attention to the main points discussed, as well as the provision of an index, make it easy to refer to any particular point on which information is needed.

The language used is easy to understand, and for those readers not familiar with technical terms a glossary is provided. M. T.

Ahlgren, G. H., Klingman, G. C. and Wolf, D. E.
Principles of weed control.
Chapman & Hall, Ltd., London and John Wiley & Sons, Inc., New York 1951 : 44s. : Pp vii + 368.

As scientific weed control is such an important feature of modern farming practice and has recently been the subject of much research, this excellent book is sure to be of wide interest. Besides discussing general principles it gives practical details of the various methods now used for the control and eradication of weeds, with special reference to row crops, small grains, flax, drilled and broadcast legumes, vegetables and fruits, ornamental plants, grasslands, turf, lawns, roads, power transmission lines, railways, ditches, stream banks, lakes and ponds.

The book is essentially concerned with weed control in the United States, and the vast majority of the references are to papers published in America. Although Latin as well as common names are given for most of the weeds mentioned, a few are referred to only by common names which may not be familiar to readers in other countries. M. T.

Petersen, A.
Die Bekämpfung der Ackerunkräuter. **(The control of field weeds).**
Akademie-Verlag, Berlin 1951 : 5 DM : Pp. viii + 84.

The first section of this small volume on weed control describes the general principles to be applied in maintaining a healthy crop free from infestation; the second section deals with the particular characteristics of certain of the most noxious weeds and the special measures they call for. In the third section the characteristics of the individual crops *vis-à-vis* weed infestation are analysed.

An appendix discusses the significance of weeds as indicators of the nature of the land.

Le Gros Clark, F. and Pirie, N. W.
Four thousand million mouths.
Oxford University Press 1951 : 12s. 6d. : Pp. 222 : figs : tables.

The several authorities who contribute to this book are all confirmed Malthusians and from their respective angles make suggestions as to how the disaster may be delayed—none of them has apparently any plan for averting it entirely, unless some miracle were to occur—for instance, that the prolific nations such as China and India should limit their births before it is too late.

After a somewhat noncommittal introduction by F. le Gros Clark, defining the Malthusian standpoint, G. V. Jacks gives an outline of the part that could be played by soil conservation in general and prevention of erosion in particular; in this section we were somewhat surprised to read that in western Europe "there is no soil deterioration"; also by the definition of climax vegetation as "the ultimate *and most complex*". F. Yates states the part that can be played by manuring, and we were interested to learn that the optimum has been reached, if not surpassed, in sugar beet and potatoes, the plants that are going to benefit most being evidently the grasses. F. C. Bawden makes it clear that the control of diseases, though it cannot solve the problem, can contribute, and that the limiting factors at present are the number of plant pathologists, available and employed, and the readiness of authorities to take preventive measures, and if necessary pass legislation, in time to avoid serious epidemics such as swollen shoot of cacao, which never need have reached epidemic proportions. S. C. Harland, in an essay on the role of genetics, expresses some novel and stimulating ideas; cotton has, by genetic selection, been "put into the category of a first-class oil plant"; sweet-stemmed maize and frost-resistant tomatoes and tobacco are among the other new and original sources of food mentioned; and of the groundnuts scheme in Africa it is said that "although certainly destined to be the biggest flop since the South Sea Bubble, (it) will only fail because it was planned by the wrong men, accepted as sound by the wrong men, administered by the wrong men, and put in the wrong part of what may even be the wrong continent". H. D. Kay, in an essay where it is sometimes difficult to disentangle the two aspects of increasing available supplies and making propaganda for increased consumption, emphasizes the importance of raising quality in both cattle and grazing. J. Hammond makes a plea for the officially somewhat slighted pig, and for fish meal, of which we read more in the next essay by C. E. Lucas, who sounds a note of warning however that there will not necessarily always be more fish in the sea, an aspect also stressed by G. A. Reay and C. L. Cutting, who urge avoidance of waste. So does N. W. Pirie, as well as giving a rather uninviting picture of future diets featuring fish meals, soya flour, whale meat and yeast! We enjoyed his reprimand to those whose "preoccupation with grass, which in some

quarters reaches almost obsessive levels, is to be deplored". In the last essay A. L. Bacharach and T. Crosbie-Walsh tell us about modern methods of processing food.

It is clear from this book that before humanity finally dies of starvation it will have undergone many new and curious experiences in the way of modification of its accepted menus.

TROLL, W.
Das Virusproblem in ontologischer Sicht. (**The virus problem from an ontological point of view**).
Franz Steiner Verlag 1951 : DM 16 : Pp. vi + 155 : 40 figs.

The problem examined by the author in this interesting publication is the extent to which recent work on viruses has necessitated modification in the fundamental distinction believed by many to subsist between living and nonliving matter. Since the book is not intended solely for biologists, a concise general account is given of the distinguishing characteristics of living organisms as opposed to nonliving, and of the nature of viruses. The view is adopted that it is meaningless to speak of life except as an attribute of an organized system; therefore complex organic substances such as nucleoproteins are regarded as nonliving, unless components of some such system.

In his analysis of the differences between living and nonliving things, the author is of the opinion that the distinction has become sharper with increased knowledge. Much emphasis is laid on the ordering of aminoacid residues within naturally occurring proteins and on the stereoisomeric specificity of so many naturally occurring organic compounds. These characteristics are contrasted with the properties of artificially produced polypeptides, and lead the author to the conclusion that far from life having emerged from protein interaction, proteins of the natural type appear in all cases to be a product of some preexisting organism. The author distinguishes between euviruses, such as tobacco mosaic virus, which are organic compounds, and the larger apparently organized viruses, which he terms pseudoviruses. The latter are regarded as living systems, the former as nonliving products of living systems. In view of the dependence of euviruses on living systems for their multiplication, the author finds their significance for the origin of life nil. He also shows that such terms as reproduction apply only analogically to euviruses.

The foregoing analysis naturally brings the author to examine the many attempts that have been made to explain how life may have arisen in the first place. The frequently suggested picture of life emerging from an accumulation of preformed proteins is criticized as quite at variance with what is known of the behaviour and properties of biological proteins, and is thought to involve improbabilities of astronomic dimensions. The interlocking of proteins to form the complex enzyme systems necessary for life as we now know it is held to involve further improbabilities of a similar order. In this connexion, the author has some pertinent criticisms of those who regard the small size of microorganisms as in some way "nearer" to the inorganic level. It is pointed out, that from the point of view of biochemical cellular organization, bacteria are on the same level as higher organisms, or possibly higher.

These conclusions are interpreted as showing that the distinction between the living and nonliving things is real, and not merely a matter of convenience or definition, and that life represents a *novum* over and against nonliving matter. As to how it arose, the author frankly admits that some extrinsic cause is necessary, which in English would be called God, in German an impenetration of cosmic creative power from the metaphysical sphere.

Professor Troll is perhaps best known outside Germany for his morphological theories and for his stalwart defence of Goethe's biological views. The present work is a clear and straightforward discussion of a problem of great current interest, and though philosophical issues are frequently touched upon, these are treated in such a way as to present few obstacles to the average scientific reader. Many will disagree with the sharpness of the distinction that the author draws between living and nonliving things; but such a treatment is a useful corrective against the glib and as-yet unproven assumption that there must necessarily be some connecting bridge between the two.

Sortenliste der in der Deutschen Demokratischen Republik zugelassenen Sorten von Kulturpflanzen. (**List of varieties of crop plants authorized in the German Democratic Republic**).
Deutscher Zentralverlag, Berlin 1951 : $0·14 : Pp. 36.

This list contains the names of all varieties whose cultivation is authorized in the Soviet Zone of Germany and no variety that does not figure in the list may be certified or put on the market, except varieties imported from abroad with the permission of the Ministry of Agriculture. It contains certain varieties that are

being withdrawn but whose sale is permitted up to 1952 or 1953.
The crops are grouped as agricultural plants, vegetables, fruits, medicinal plants and stimulants. An appendix gives the Latin equivalents of the German crop names.

FRANKLIN, M. T.
The cyst-forming species of *Heterodera*.
Commonwealth Agricultural Bureaux, Farnham House, Farnham Royal, Bucks 1951 : 18s. 6d. : Pp. 147 : 21 figs.

Although there has been a considerable amount of research on various aspects of the biology and control of economically important cyst-forming species of *Heterodera*, publications have so far remained widely scattered. The comparatively recent splitting of the species *H. schachtii*, however, formed a stimulus for the collation of literature, resulting in the present review of most of the published work on cyst-forming species up to the end of 1948.
An introductory chapter gives a brief outline of the morphology and life history of the type species, *H. schachtii*, and traces the taxonomy of the genus since 1855, when *H. marioni* was discovered. The latter species lacks a cyst stage and is therefore excluded from the main part of the book which deals in turn with each of the most economically important species, *H. schachtii*, *H. major*, *H. gottingiana* and *H. rostochiensis*, and with the potentially dangerous species, *H. cacti*, *H. cruciferae*, *H. humuli* and *H. punctata*, which have as yet caused only slight damage to crops. Accounts of the nematodes follow a common plan comprising sections on nomenclature, detailed morphology and anatomy, bionomics, effect on host, host range, relative resistance of crop varieties, control of the parasites and their distribution. The text is amply supplemented with original drawings, illustrations from other publications and photographs. As a compact monograph, including a bibliography of more than 600 titles compiled at the Commonwealth Bureau of Agricultural Parasitology, St. Albans, this book serves a useful purpose and can be recommended as a basis for future work on the genus; in this connexion it should be of value to breeders engaged on developing resistant crop varieties.

TARR, S. A. J.
Leaf curl disease of cotton.
Commonwealth Mycological Institute 1951 : 12s. 6d. : Pp. 55 : 2 tables : 12 plates : 1 map : 1 graph.

This concise, well-written monograph reviews the probable origin, host range, distribution and economic importance of the cotton leaf curl virus in the Anglo-Egyptian Sudan, with details of symptomology, histopathology and mode of transmission. A discussion of control measures is followed by a general account of methods by which resistant individuals, occurring occasionally among highly susceptible populations of *Gossypium barbadense*, have been selected to form strains with a degree of resistance resembling that of *G. hirsutum*. Reference is made to research in progress up to 1949, including the selection of leaf curl resistant strains of Sakel which already possess resistance to blackarm.
The text is supplemented by a distribution map, numerous photographs and an exhaustive bibliography.

BANGA, O.
4e beschrijvende rassenlijst voor groentegewassen (groentegewassen, tuinbouwmaïs, tabak, aardbei, geneeskrachtige en aromatische kruiden). [**Fourth descriptive variety list for vegetables (vegetables, maize, tobacco, strawberries, medicinal and aromatic herbs)**].
Inst. Vered. Tuinbouwgewassen, Wageningen 1951 : f. 1·50 : Pp. 172.

As with all publications of this nature, each successive year of publication (cf. *Plant Breeding Abstracts*, Vol. XX, p. 369) renders the list, issued under the aegis of the Institute for the Breeding of Horticultural Plants, Wageningen, more valuable. Drawn up as a result of direct observation and of cooperation with experts, the descriptions given may be regarded as authoritative and provide reliable guidance for the grower or plant breeder in making a choice of varieties or strains of vegetables for growing or breeding.
With the permission of the authorities concerned, the list has been enlarged by incorporating the sections on (1) early potatoes, swedes and field peas, taken from the 26th Descriptive Variety List for Agricultural Crop Plants (cf. p. 169), and (2) strawberries, taken from the Descriptive List of Fruits. The section on medicinal and aromatic herbs is also new.
Many sections dealing with the various groups of vegetables have been partially or wholly revised by specialists. Selections included in the list of vegetables are accompanied by the name of the producer, so that users may know where the good selections can be obtained. The sections on peas and beans contain information on diseases and disease resistance.

The botanical Latin names and the index under Dutch names are most useful for foreigners using the list, and possibly for Dutch readers as well.

The modest price in no way represents the value of the work or the immense amount of knowledge and labour that has been put into the compilation of this most valuable reference book.

Tuinbouwgids 1952. (**Horticultural guide 1952**).
Uitgave der Directie van de Tuinbouw, Den Haag 1952 : f. 5 : Pp. 693 : figs : tables : maps.

The 1952 edition of this excellent reference book (cf. *Plant Breeding Abstracts*, Vol. XXI, p. 458) once again demonstrates how a mass of comprehensive and highly detailed information on horticulture can be made easily accessible to readers by ingenuity in arrangement and in methods of indexing and by the use of illustrations.

The present volume differs from its predecessors in including a glossary (consisting mainly of nouns and verbs) in Dutch, French, German, English and Spanish for the use of foreign readers. This glossary, which occurs at the beginning and end of the volume for convenience of reference, should be of great assistance to those unfamiliar with the Dutch language and will certainly increase the value of the guide in countries outside Holland and its territories overseas.

NEW JOURNALS

Fachliche Mitteilungen der Österreichischen Tabakregie.

The publication of the *Fachliche Mitteilungen der Österreichischen Tabakregie* (*Technical Communications of the Austrian Tobacco Monopoly*) was interrupted in 1938. In its new form the first number appeared in March 1951 and a second in August of the same year. The journal contains contributions by experts on a variety of topics concerned with tobacco growing and research, and the first two numbers include articles on "Ways and objectives in tobacco investigation", "Tobacco breeding in Austria", "Testing interesting tobacco varieties from the world collection", "International cooperation in tobacco affairs" and "International protection of the products of tobacco breeders" (cf. Absts 1310, 1311, 1312 and 1322).

The journal comprises four numbers a year and is published by the Generaldirektion der Austria Tabakwerke A.G., Berggasse 16, Wien IX, Austria.

Ikushugaku Zasshi.

The first number has been received of *Ikushugaku Zasshi* (*Breeding Magazine*) or the *Japanese Journal of Breeding*. It is published by the Nippon Ikushugaku Kai (Japanese Society of Breeding), Faculty of Agriculture, Tokyo University. The papers are in Japanese, the longer ones with English summaries. With the exception of two papers on animal breeding, all the contributions to the first number are concerned with plant breeding and have been summarized in this number of *Plant Breeding Abstracts* (cf. Absts 883, 906, 1143, 1154, 1181 and 1194).

Symposia Genetica.

The Centro di Genetica del Consiglio Nazionale Ricerche [Genetics Centre of the National Research Council], situated at the University of Pavia in Italy, has initiated the publication of these *Symposia*, the object of which is to provide a series of monographs by acknowledged authorities in different branches of genetics. The first volume is entitled *Metodi e Tecniche di Ricerca Genetica* [*Methods and techniques of genetical research*] and contains outlines of modern knowledge of cytology by C. Barigozzi, of statistical genetics by A. Buzzati-Traverso and of physiogenetics by C. Manunta. In this last, the author gives a detailed description of her technique of combined physiological and genetical investigation of the carotenoid and flavone pigments in silkworms, in which she has made such notable contributions in collaboration with Professor Carlo Jucci.

The *Symposia* are obtainable from the Centro di Genetica del Consiglio Nazionale delle Ricerche presso l'Università di Pavia, Italy. The price of the first volume (1951) was 2000 lire, 3·5 US dollars, exclusive of postage.

Zeitschrift für Forstgenetik und Forstpflanzenzüchtung.

Genetics is in Germany now regarded as one of the most important bases of sylvicultural practice, just as it is the basis of all rational plant and animal improvement. Work on forest genetics and breeding has hitherto been published in a variety of different places but this new journal, which is published in close associa-

tion with the *Allgemeine Forst- und Jagdzeitung*, now provides a medium through which the main German contributions to this important subject may appear together. The first number, published in 1951, contains articles on interspecific *Larix* hybrids, the progenies of young and old spruce trees, and the chromosome numbers of forest trees; all are reviewed in this number of *Plant Breeding Abstracts*.

The journal appears at quarterly intervals, at a price of DM 22 per volume plus postage, with reduced rates for subscribers to the *Jagdzeitung* and for students. The publisher is J. D. Sauerländer's Verlag, Frankfurt a.M., Germany.

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